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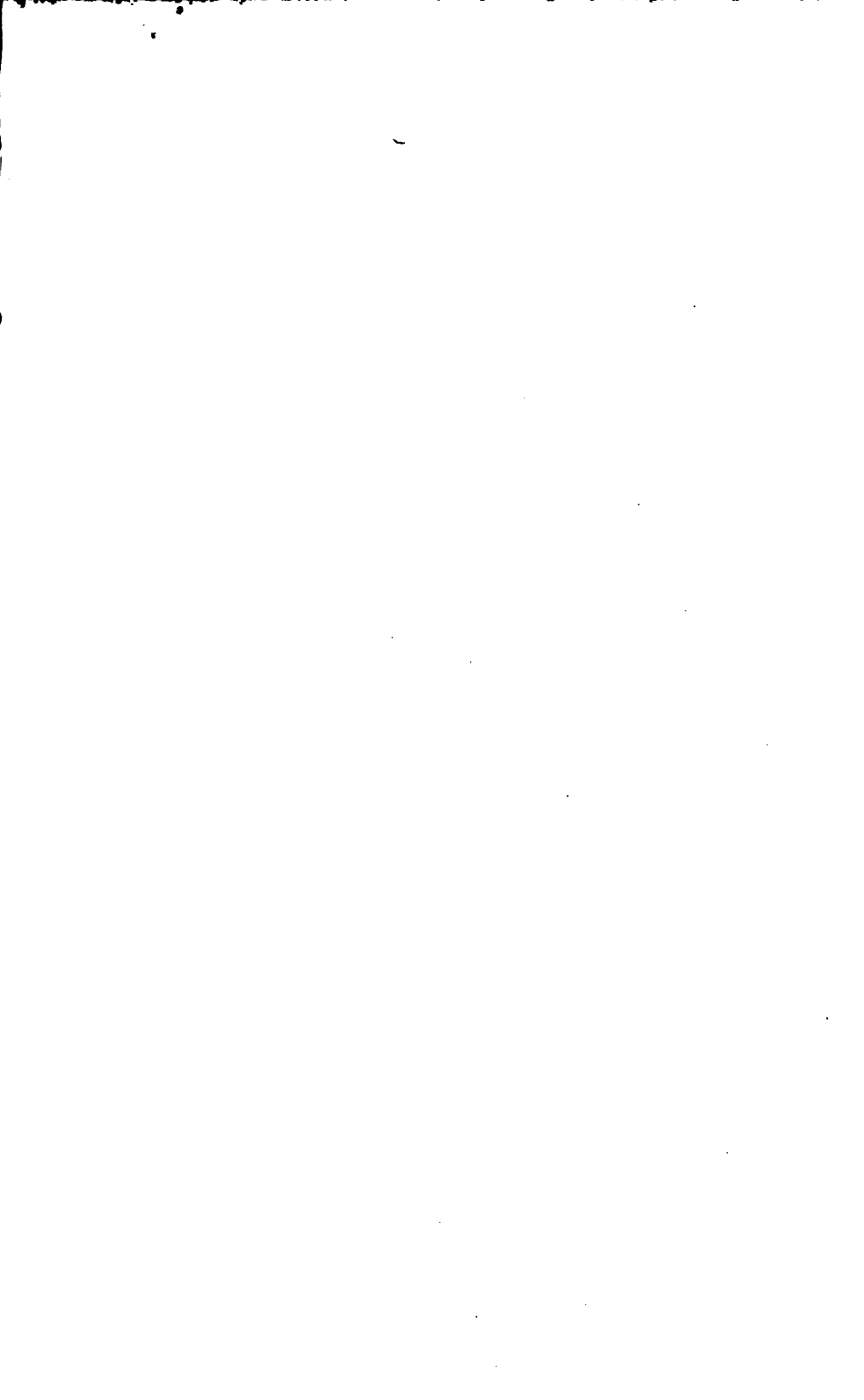
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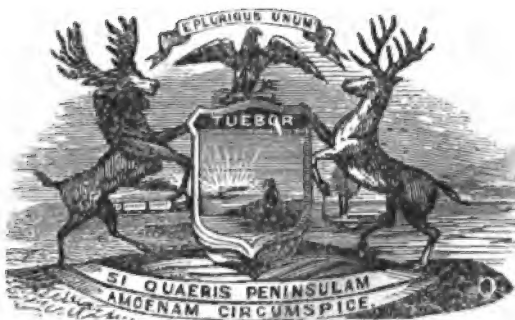








SIXTH ANNUAL REPORT  
OF THE  
SECRETARY  
OF THE  
STATE BOARD OF AGRICULTURE  
OF THE  
STATE OF MICHIGAN,  
FOR THE YEAR 1867.



BY AUTHORITY.

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# State Board of Agriculture.

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HIS EXCELLENCY HENRY H. ORAPO, *Ex-Officio*,  
PRESIDENT OF THE BOARD.

HON. HEZEKIAH G. WELLS, of Kalamazoo,  
VICE PRESIDENT.

HON. DAVID CARPENTER, of Blissfield.

HON. JUSTUS GAGE, of Dowagiac.

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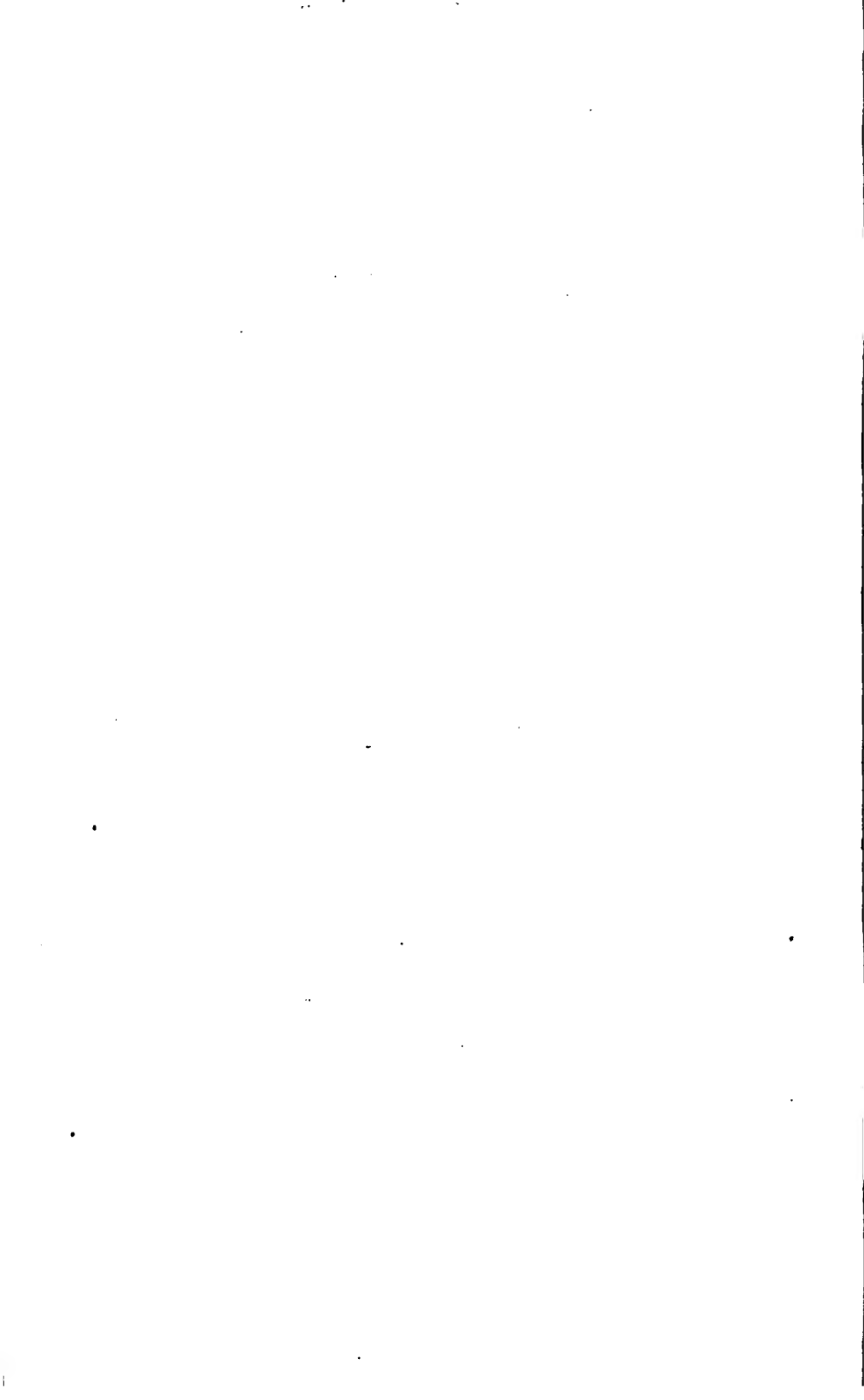
HON. S. O. KNAPP, of Jackson.

T. C. ABBOT, A. M., *Ex-Officio*,  
PRESIDENT OF THE COLLEGE.

---

SANFORD HOWARD, SECRETARY.

JOSEPH MILLS, of Lansing,  
TREASURER.





**REPORT OF THE SECRETARY OF THE STATE BOARD OF  
AGRICULTURE.**

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**LANSING, December 31, 1867.**

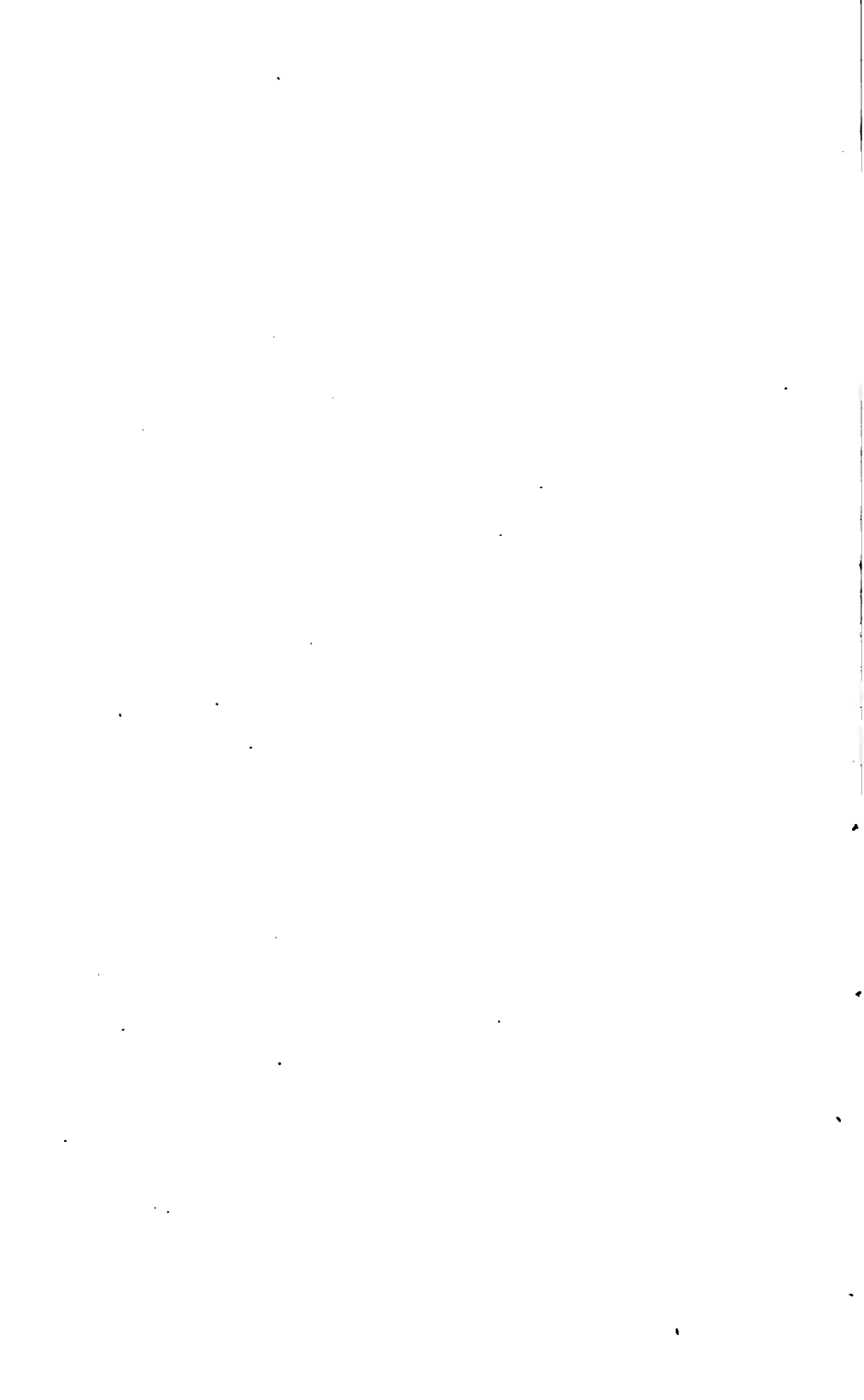
**To His Excellency HENRY H. CRAPO,**

*Governor of the State of Michigan:*

**In compliance with legal requisitions, the accompanying  
Report for the year 1867, with supplementary papers, is  
respectfully submitted.**

**SANFORD HOWARD,**

*Secretary of the Michigan State Board of Agriculture.*



## STATE AGRICULTURAL COLLEGE.

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The year 1867 has been one of comparative prosperity to this Institution. The number of students has been as great as could be received with the present dormitory accommodations, while a great number who applied for admission were necessarily refused for want of room. How long this obstacle to the extension of the benefits of the Institution will be allowed to exist, we cannot tell. The College is making every practicable exertion, with the means at its disposal, to provide the accommodations which are evidently required. But the appropriations lately made by the Legislature, have been only sufficient to defray current expenses, leaving no funds for the erection of buildings or for other improvements, except what may have been derived from the sale of swamp lands; and though something has been realized from this source, it has chiefly been applied to relieving the more pressing wants of the Institution, in regard to the shelter of live stock, providing a green-house, the repairs of buildings, &c.

In regard to out-door operations, the season has been unfavorable to most crops. The extreme wetness of the spring delayed planting to a late period, besides packing the soil so closely in many instances as to prevent it from affording proper support to plants during the season. The summer and autumn were remarkable for drought, seriously injuring all late crops. The yield of Indian corn on the farm, about thirty bushels to the acre, was probably lessened at least one-third by drought. Had it been practicable to have drained a portion of the field where the corn grew, the crop could have been planted earlier, and would have suffered less, both from wet and

drought. Grass grew well the fore part of the season, giving a good first crop of hay, and abundant early pasturage. Scarcely any second crop hay was obtained, and the pastures were bare and brown from July till they were covered with snow.

The root crop was injured by drought,—a portion of it from the beginning, the ground being so dry that the seed did not germinate well,—but by keeping the crop entirely free from weeds, it sustained itself so well as to give about three-fourths of an average yield.

The live-stock on the farm has generally done well. Two Short-horn heifer calves have been added to the herd. One Devon bull calf, a very promising animal,—the first of the get of the imported bull Prince of Wales since he arrived here,—has been produced, and was sold when about three months old. A very fine young Ayrshire bull has been obtained from the noted herd of Messrs. Wolcott & Campbell, of New York Mills, N. Y., for the purpose of supplying the place of the older bull at the proper time. Several half-bloods from the Galloway, and several from the Ayrshire bull, are being reared. Those from the former are large, robust and thrifty; those from the latter are of medium size, and so far as they can be judged by their points, are the most promising in reference to dairy properties, of any stock yet bred on the farm.

Three bulls,—the Galloway, Ayrshire, and a young Devon bred on the farm—were exhibited at the last show of the Michigan State Agricultural Society, at Detroit, where they attracted considerable attention. They were not entered for premium. Several cattle and sheep belonging to the College were also presented for exhibition only, at the show of the Central Michigan Agricultural Society, at Lansing. Some of the sheep belonging to the College were entered in a public shearing held by the latter Association in May last, a report in regard to which will be found in another part of this volume.

An experiment to test the relative value of different articles

of food for feeding sheep, was commenced in 1866, and is still in progress. A summary of results thus far obtained, is herewith appended.

The stock of Essex, Suffolk, and Chester-County swine has increased. It is much to be regretted that we have not yet been able to provide such accommodations for these animals as to admit of making any proper experiments to test, accurately, the relative profits of the different breeds.

In the improvement of the farm, considerable advance has been made during the present year. The powerful stump machine belonging to the College has been much used, and several large fields are now cleared from stumps, giving free course to the plough, and permitting the ground to be brought into a condition, not only more agreeable to the sight, but also better adapted to the production of crops, and much better fitted for the use of labor-saving implements in securing them. A portion of the ground thus prepared, was sown to wheat the past autumn. Under-draining has been extended, including a deep drain required to take the water from the ground near the cattle barn and the cellar of the farm house, and several drains in other places. New lines of fences have been built. The lane which is intended to divide the cleared portion of the farm into east and west divisions, has been extended, so that with little additional labor, it will lead from the highway on the north line of the farm, to the woods on the south. A self-acting gate has been set up at what is hereafter to be the entrance to the College grounds from the highway, and from that point a board fence has been substituted for the former rail fence along the road, and will be extended to the north-east corner of the farm as soon as the state of the ground will admit of it, the coming season.

Besides a suitable piggery, to which allusion has before been made, the Farm Department is greatly in need of a workshop, where students could learn to use mechanical tools. It is perhaps as important that they should be able to make and repair farm implements, as that they should know how to do any

other work. On this point the Superintendent of the farm well observes:

"A work-shop would furnish facilities for the instruction of students, and enable us to economize in making our own repairs of tools, to a certain extent, and at the same time furnish work to the student that would be remunerative at times when it is difficult to find profitable employment of the whole force out of doors. At present we have no place where work of this kind can be done."

#### SWAMP LANDS.

The improvements sometime since commenced on the swamp lands, have been continued. The main ditch through the "Big Marsh" has been completed, allowing the waters of Mud and Park lakes to flow through. The result has been the lowering of the surface of those lakes, as well as the settling of the marshy land along their shores, and along the line of the ditch. Seeds of the cultivated grasses have been sown on the reclaimed portion of the marsh. The grass from the first sowing was mostly destroyed by being flooded with water just as it was coming up; that from seed sown the past autumn looks well.

The Ingham and Clinton State Road crosses the Big Marsh on the township line between De Witt and Bath, and is so far completed as to allow teams to pass across the marsh. Access is thus given to the College lands without crossing the lands of individuals. The effect of these improvements will be to enhance the value of the land, which will be brought into a state more or less productive.

#### THE PROCEEDS FROM THE FARM,

for the year 1867, are given by the Farm Superintendent as follows:

Cash sales of produce, .....	\$ 654 84
Produce sold to Boarding Hall, .....	684 72
"    to Farm House    "    .....	265 19
	<hr/> \$1,604 75
Wool (unwashed), 647 lbs. at 30 cts., .....	194 10
118½ tons of hay, at \$10, .....	1,185 00
1,239 bushels corn (in the ear), .....	516 00

2,095 bushels roots, at 12½ cts.,.....	\$261 87	
260 " oats,.....	169 00	
Corn fodder and straw (estimated),.....	162 00	
1 Ayreshire bull calf (sold),.....	\$125 00	
2 Short-horn heifer calves, .....	200 00	
1 Devon bull calf (sold),.....	150 00	
18 grade calves,.....	100 00	
		575 00
4 Merino ewe lambs,.....	20 00	
4 " ram " .....	20 00	
1 South Down ewe lamb,.....	5 00	
2 " ram lambs,.....	20 00	
1 Cotswold ewe lamb,.....	20 00	
1 " ram " .....	20 00	
15 grade lambs,.....	30 00	
		135 00
15 Suffolk pigs, at \$4,.....	60 00	
3 Chester White pigs, at \$4,.....	12 00	
		72 00
		<u>\$4,874 72</u>

In the Horticultural Department, a fair degree of success has attended most operations. Though the dry weather reduced the quantity of produce, it was favorable to the employment of labor in works of improvement, which have been steadily carried forward. In the vegetable garden the benefits of a plan by which horse labor has been substituted for manual labor, have been strikingly advantageous in reference to economy, and also in lessening the injurious effects of the drought by frequent stirring of the soil.

The trees in the pear orchard have for the most part made a good growth, and a few of them fruited. The apple orchard is in good condition; the trees are mostly handsome and thrifty, though growing too fast to bear much fruit. A nursery of evergreen trees has been started—the trees to be planted chiefly for the purpose of sheltering a portion of the grounds from cold winds, to which they are much exposed. Most of the smaller fruits, and vegetables of all kinds adapted to the climate, have been produced in abundance; while the floral and ornamental grounds, except during the most severe drought, have presented an attractive appearance. Efforts for the improvement of the tomato have been continued, with encouraging suc-



cess. Many varieties were cultivated in the garden the present season, and their varied appearance and qualities have been a subject of interest.

A collection of vegetables and fruits from the College grounds, presented at the last exhibition of the Central Michigan Agricultural Society, attracted much attention.

Permanent improvements in this department have been made to a considerable extent during the past season. A green-house has been built and partly stocked with plants. A stable for the accommodation of the horses used in the department, is nearly completed. A large amount of grading and smoothing has been done on the grounds between the College Hall and the line of the former highway, and a portion has been seeded to grass. The rough grounds on the west and south of the College Hall have been broken up, and progress made toward bringing them into such a condition that they will no longer be a blemish and eye-sore. The orchard has been entirely freed from stumps, and the former site of the farm-house has been graded and set to trees to conform to the plan observed in planting the others.

The receipts and expenditures of the Horticultural Department for the year 1867, are stated as follows:

## EXPENDITURES.

Hired man by the month, .....	\$137 00
Board of same 40 weeks, at \$3 50, .....	140 00
Keeping of team 40 weeks, at \$6 50, .....	260 00
Labor by the day, .....	17 62
Board of hired help in vacation, .....	30 00
Labor of students " " .....	80 00
Hardware and tools, \$25; lumber and nails, \$30 40, .....	55 40
7,813 hours labor of students, at 7 cts., .....	546 91
Team and harness acct., .....	13 62
Blacksmithing and repairs of wagons, .....	20 20
Expenses of labor on blind drain, .....	62 35
Tools and repairs of same, .....	59 25
Plants, seeds and grass-seed, .....	67 52
Manure, .....	4 22
Office account—blank books, stationery, postage, &c., .....	17 03

**\$1,517 12**

## RECEIPTS.

Sales of produce for cash,.....	\$169 48	
Hay (5 tons),.....	60 00	
Produce to Boarding Hall and Farm,.....	414 14	
Produce stored,.....	423 50	
		<hr/> 1,067 12
		<hr/> \$ 450 00
		<hr/>

This balance of \$450 beyond receipts, has been expended in care of orchards and nurseries, improvement of lawns, increased number and value of implements, and the permanent improvement of the premises.

## DONATIONS TO THE COLLEGE FOR 1867.

- From A. L. BREARLEY & Co., Trenton, N. J. ;  
Phifer's Wheel Cultivator and Gang Plough.
- From T. L. HARRISON, Esq., Morley, N. Y. ;  
A fine Scotch Highland Ram.
- From F. F. HOLBROOK, Boston, Mass. ;  
The Universal Plough, of two patterns.
- From — — —, through Hon. A. N. HART, Lansing ;  
Gladding's Horse Pitchfork.
- From DODGE, GALE & Co., Kalamazoo ;  
Patent Three-Horse Clevis, and Dodge's patent Plough-wheel.
- From C. S. S. GRIFFING, Genoa, Ohio ;  
The right to use on the College Farm, a Portable Field Fence and Gate.
- From ROSE & COGSWELL, of Detroit ;  
Hawxhurst's Adjustable Hoe.
- From HOVEY & Co., Grand Rapids ;  
A complete and valuable set of specimens of gypsum.
- From the EAST SAGINAW SALT MANUFACTURING COMPANY, through H. M. Newton, Supt. ;  
Specimens of salt, including coarse, fine, and dairy salt.
- From Hon. M. D. HOWARD, of Holland ;  
Specimens of sandstone from that locality.
- From Hon. J. W. LONGYEAR, Lansing ;  
Report of the Secretary of War, for 1864 and 1865 ; Report of the Secretary of the Treasury on Foreign and Domestic Commerce, for 1864 ; Report of Secretary of State, on Commercial Relations, for 1863, 1864 and 1865 ; Report of the Secretary of the Treasury, on Commerce and Navigation, for 1862, 1863, 1864 and 1865 ; Report of the Secretary of the Treasury, on Finances, for 1864 and 1866 ; Report of the Commissioner of Internal Revenue, for 1864, 1865 and 1866 ; Report of U. S. Revenue Commission, for

1865 and 1866; Report of the Commissioner of Agriculture, for 1864; Report on the Condition of the Indians, for 1867; Report of Joint Committee on Reconstruction, 1866; Report of Joint Committee on the Conduct of the War, Vols. I, II, and III; Report on the Smithsonian Institute, for 1864, and 1865; Report of Commission for Revising Revenue System, 1866; Report of the Committee on the Assassination of President Lincoln; Report of the Committee on the Memphis Riots and Massacre; Report of the Committee on the Defense of the N. E. Frontier; Message and Documents of the Department of State, Parts I, II and IV, 1864-65; also, Parts I and II, 1865-66; Message and Documents of the War Department, Parts I and II, 1865-66; Message and Documents of the Post Office and Interior Departments, for 1864-65, also, for 1865-66; Message and Documents of the Navy Department, for 1865 and 1866; Message and Documents of the President of the United States, for 1864 and 1865, with budget for 1864-65 and 1866; Patent Office Report for 1863, Vols. I and II, also for 1864, Vols. I and II; Congressional Directory of the XXXIXth Congress; U. S. Internal Revenue Laws in Force, August, 1866; Form of Bill establishing Rates of Duty on Imported Goods, &c.; U. S. Navy Register, 1867; Congressional Globe for 1863-64, Parts I, II, III, IV; for 1864-65, Parts I and II; for 1865-66, Parts I, II, III, IV, V; for 1866-67, Parts I, II, III; Census of 1860, Agriculture, Manufactures, Mortality, Miscellaneous.

From Hon. Z. CHANDLER;

Patent Office Report for 1863, Parts I and II; for 1864, Parts I and II; U. S. Census of 1860; Manufactures; U. S. Navy Register for 1866 and 1867; U. S. Treasurer's Report; Commerce and Navigation, 1865; Survey of the Upper Mississippi River; Mineral Resources of the United States.

From Hon. I. NEWTON;

Report of the Commissioner of Agriculture, 1865; Monthly Reports of the Department of Agriculture.

From Prof. A. D. BACHE;

U. S. Coast Survey.

From Prof. J. E. TENNEY, Lansing;

Public Laws of the United States, passed by the XXXIXth Congress; Statutes at Large of the XXXIXth Congress.

From C. H. DAVIS, Supt. of the Naval Observatory, Washington;

Astronomical Observations for 1864.

From Hon. J. M. HOWARD;

Patent Office Report, 1864, Vols. I and II; Conduct of the War, Supplement, Parts I and II; packages of seeds—fourteen kinds.

From E. H. BRADNER, Bedford, Mich.;

Seeds for Vegetable Garden; specimen of pine wood (*Pinus mitis*) from the rebel ram Atlanta.

- From D. K. GUNN, Ionia;  
Garden Seeds.
- From Hon. O. F. HOWARD;  
Seeds of Spanish Onion.
- From JAMES SATTERLY, Greenville;  
Six American Chestnut trees (*Castanea vesca*.)
- From J. E. BERRY, St. Louis;  
Specimen of bark of the canoe birch (*Betula papyracea*.)
- From MILLER & SMITH, Reading, Pa.;  
One keg (70 lbs.) superphosphate of lime.
- From A. F. GAYLORD, Eaton Rapids;  
Hartford Prolific grape-vines.
- From Prof. A. N. PRENTISS;  
Cuttings of green-house plants, and grape-vines of the following varieties: Ives, Concord and Delaware.
- From W. W. TRACY;  
Plants and bulbs, including Japan lilies and fifteen varieties of gladiolas.
- From Hon. O. L. SPAULDING, Secretary of State;  
Laws of Michigan, 1867, Vols. I and II.
- From the U. S. SANITARY COMMISSION;  
Documents, Vols. I and II; Bulletin, nine vols. in one.
- From B. F. SANDS, Superintendent;  
Astronomical Observations, 1851 and 1852.
- From the SMITHSONIAN INSTITUTE;  
Miscellaneous collection, Vols. VI and VII.
- From Hon. GEORGE GEDDES, Syracuse, N. Y.;  
History of the origin of the Erie Canal.
- From S. D. BINGHAM, Esq., Lansing;  
Report on Prisons and Reformatories in United States and Canada.
- From T. C. ABBOT;  
Todd's Student's Manual; Sargent's Temperance Tales; Kilto's History of Palestine; Abbot's Young Christian; Abbot's Hoaryhead.
- From the publishers the following papers have been received:
- Western Rural.
  - Christian Herald.
  - Railroad Record.
  - Wolverine Citizen.
  - Sturgis Journal.
  - Bay City Journal.
  - Ann Arbor Journal.
  - Michigan Argus.
  - Prairie Farmer.
  - Lansing Republican.
  - Monthly Journal.

American Missionary.

Magazine of Horticulture.

American Farmer.

Proceedings of Essex Institute.

From MEMBERS OF THE FACULTY;

Detroit Post, Tri-weekly.

“ Advertiser and Tribune, Tri-weekly.

“ Free Press.

New York Tribune, Weekly.

The Congregationalist.

The Advance.

The Independent.

SANFORD HOWARD,

*Secretary Michigan State Board of Agriculture.*

## SECRETARY'S ACCOUNT.

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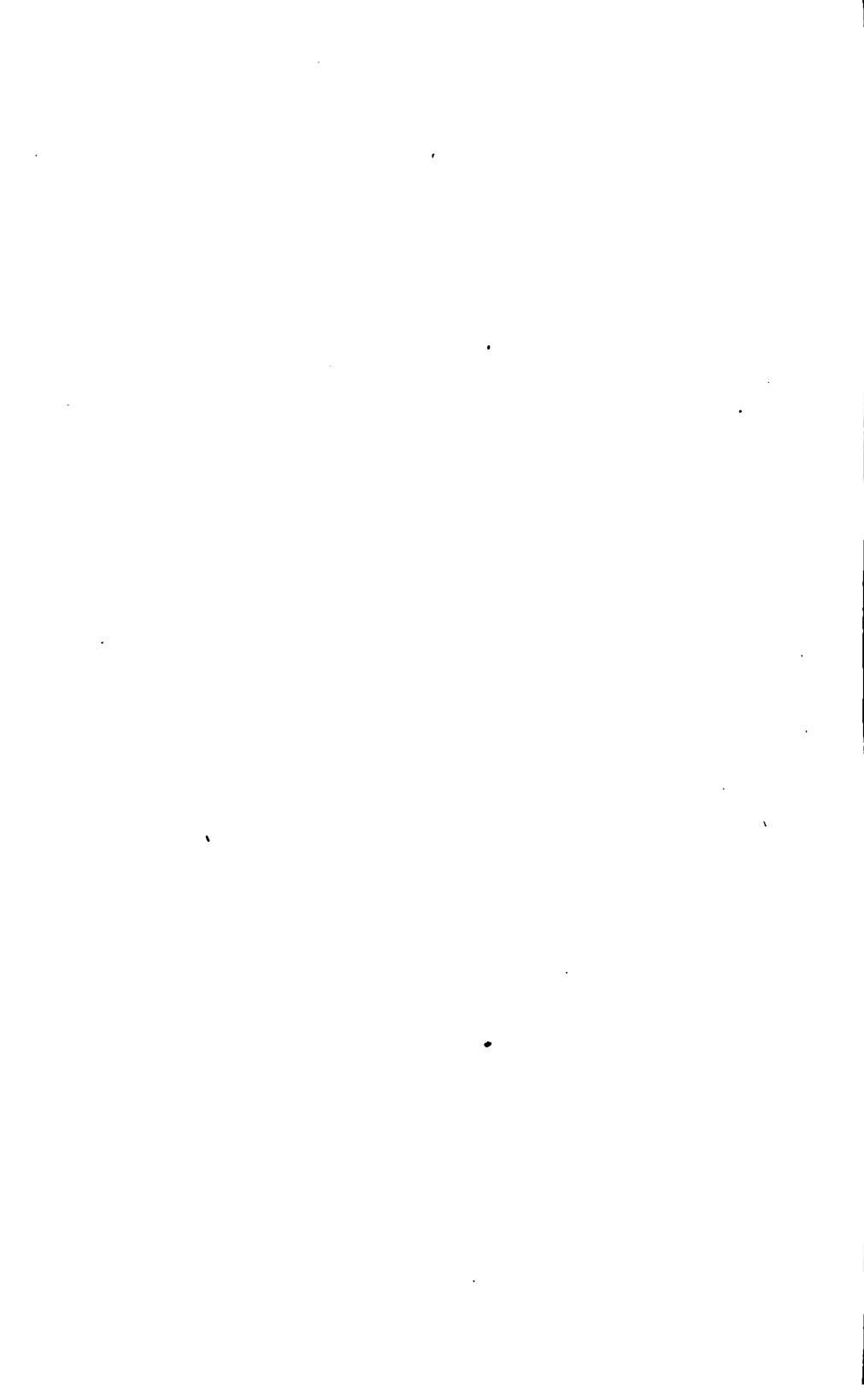
### *Receipts for year ending Dec. 1, 1867.*

1866.		
Dec. 1.	Cash on hand, .....	\$ 2,078 00
1867.		
Dec. 1.	Cash from State Treasurer, .....	20,000 00
"	" " sales of swamp lands, .....	7,608 38
"	" " Farm receipts, .....	726 34
"	" " College bills paid by students and others, ...	6,234 63
		<u>\$36,647 35</u>

The receipts have been disposed of as follows:

1867.		
Dec. 1.	Cash at sundry times to Joseph Mills, Treasurer, .....	\$35,800 79
"	" to balance, .....	846 56
		<u>\$36,647 35</u>

SANFORD HOWARD,  
*Secretary.*





# WARRANT ACCOUNT.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
655	Jan'y 6	M. Miles, .....	Farm Department. See Farm D. Cash Account, .....	\$100 00
656	" 16	A. F. Allen, .....	Salary, 1866, .....	100 00
657	" 16	S. S. Rockwell, ....	Boarding Hall account, .....	100 00
658	" 23	" " ....	" " .....	200 00
659	March 5	F. Raymond, .....	Library and Text books, .....	230 00
660	" 9	M. Miles, .....	Farm Department, .....	150 00
661	" 15	Knott & Beamer, ..	Boarding Hall. Flour, .....	100 00
662	" 21	T. C. Abbot, .....	Salary to Dec. 1, 1866, .....	868 75
663	" 21	M. Miles, .....	" " " .....	312 50
664	" 21	R. C. Kedzie, .....	" " " .....	212 50
665	" 21	A. N. Prentiss, ....	" " " .....	150 00
666	" 21	G. T. Fairchild, ....	" " " .....	100 00
667	" 21	Sanford Howard, ..	" " " .....	23 23
668	" 22	T. C. Abbot, .....	" .....	468 75
669	" 22	M. Miles, .....	" .....	312 50
670	" 22	R. C. Kedzie, .....	" .....	312 50
671	" 22	A. N. Prentiss, ....	" .....	312 50
672	" 22	G. T. Fairchild, ....	" .....	312 50
673	" 22	Sanford Howard, ..	" .....	125 00
674	" 22	A. F. Allen, .....	" .....	100 00
675	" 22	S. S. Rockwell, ....	" .....	137 50
676	" 22	W. W. Daniels, ....	" .....	100 00
677	" 23	M. Miles, .....	Farm Department, .....	110 00
678	" 23	S. S. Rockwell, ....	Boarding Hall, .....	400 00
679	" 26	A. N. Prentiss, ....	Horticultural Department, .....	25 00
680	" 26	" " ....	" " .....	50 00
681	" 28	John Schwendener,	Boarding Hall. Soap, 1866, .....	12 23
682	" 29	D. L. Case, Exec., ..	Secretary's office rent, .....	150 00
683	" 29	F. Raymond, .....	Library and Text books, .....	100 00



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NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
655	Jan'y 6	M. Miles, .....	Farm Department. See Farm D. Cash Account, .....	\$100 00
656	" 16	A. F. Allen, .....	Salary, 1866, .....	100 00
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658	" 23	" " ....	" " .....	200 00
659	March 5	F. Raymond, .....	Library and Text books, .....	330 00
660	" 9	M. Miles, .....	Farm Department, .....	150 00
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662	" 21	T. C. Abbot, .....	Salary to Dec. 1, 1866, .....	868 75
663	" 21	M. Miles, .....	" " " .....	312 50
664	" 21	R. C. Kedzie, .....	" " " .....	212 80
665	" 21	A. N. Prentiss, ....	" " " .....	150 00
666	" 21	G. T. Fairchild, ....	" " " .....	100 00
667	" 21	Sanford Howard, ..	" " " .....	83 28
668	" 22	T. C. Abbot, .....	" .....	468 75
669	" 22	M. Miles, .....	" .....	312 50
670	" 22	R. C. Kedzie, .....	" .....	312 50
671	" 22	A. N. Prentiss, ....	" .....	312 50
672	" 22	G. T. Fairchild, ....	" .....	312 50
673	" 22	Sanford Howard, ..	" .....	125 00
674	" 22	A. F. Allen, .....	" .....	100 00
675	" 22	S. S. Rockwell, ....	" .....	127 50
676	" 22	W. W. Daniels, ....	" .....	100 00
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678	" 22	S. S. Rockwell, ....	Boarding Hall, .....	400 00
679	" 26	A. N. Prentiss, ....	Horticultural Department, .....	25 00
680	" 26	" " ....	" " .....	50 00
681	" 28	John Schwendener,	Boarding Hall. Soap, 1866, .....	18 28
682	" 29	D. L. Case, Exec., ..	Secretary's office rent, .....	150 00
683	" 29	F. Raymond, .....	Library and Text books, .....	100 00

REPORT OF THE SECRETARY OF THE  
WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
684	April 1	A. F. Allen, .....	Farm House, .....	\$50 00
685	" 1	A. J. Viole, .....	" knives, forks, spoons, .....	13 33
686	" 1	Parmelee & Davis, .	" crockery, .....	12 88
687	" 1	S. S. Rockwell, ....	Boarding Hall, .....	24 03
688	" 2	Warren Paine, ....	" " horse, .....	200 00
689	" 2	S. S. Rockwell, ....	" " .....	150 00
690	" 2	M. Miles, .....	Farm Department, .....	729 83
691	" 2	" .....	" " .....	200 00
692	" 8	S. S. Rockwell, ....	Boarding Hall, .....	891 46
693	" 8	Grove & Whitney, .	" " hardware, .....	40 51
694	" 8	Moots & Ruff, ....	" " 2 stoves, hardware, rep'rs, .....	123 21
695	" 8	Parmelee & Davis, .	" " crockery, .....	62 20
696	" 10	T. C. Abbot, .....	Salary, .....	100 00
697	" 16	E. Longyear, P. M.,	Envelopes, .....	34 80
698	" 18	O. Hosford, .....	Board Expenses, .....	40 00
699	" 20	T. C. Abbot, .....	Salary, .....	212 50
700	" 22	S. S. Rockwell, ....	Boarding Hall, .....	129 00
701	" 22	John Stephens, ...	" " groceries, .....	241 31
702	" 22	Ferie & Egly, ....	" " 9 bedsteads and repairing mattresses, .....	84 45
703	" 22	A. Bertch, .....	Boarding Hall, meat, .....	50 00
704	" 22	John A. Kerr & Co.,	Library, binding, .....	\$26 75
			Farm—Journal, etc., .....	13 00
			Catalogues, 1866, .....	51 45
			Advertising, .....	4 50
			Printing, Sec'y's office at College, .....	44 50
705	April 22	Cannell & Edmonds,	Hort. Dep't, horse blankets, etc., .....	15 98
			Farm Department, 1866, .....	5 70
			" " 1867, .....	5 15
				26 83
706	April 22	D. W. Buck, .....	Boarding Hall, mattresses, .....	37 50
			Farm House, mattress and two bedsteads, .....	24 50
			Wash-stand, College Hall, .....	3 00
				65 00

## WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
707	April 22	T. C. Abbot,.....	Board expenses,..... \$16 90	
			Postage and box, envelopes,..... 15 40	
			Office expenses,..... 9 06	\$41 36
708	" 22	Frank Wells,.....	Museum, alcohol, ..... 52 75	
			" demiJohn,..... 1 00	
			Farm, medicine,..... 6 26	60 01
709	" 22	Lansing & Son,....	Farm, blacksmithing, 1866,..... 58 17	
			" " 1867,..... 34 65	92 82
710	" 22	Smith Hunter,....	Boarding Hall, 1866, .....	95 17
711	" 22	VanKeuren & Thompson,....	Re-glazing College and Boarding Halls, ..	9 88
712	" 22	Sanford Howard, ..	Paper, postage,..... \$17 66	
			Mich. Reports, ..... 2 10	
			Other " ..... 1 15	
			Current expenses of office,..... 73 83	
			Farm, expense on hay fork,..... 75	
			Horticultural Department, expr, 1 58	
			\$97 04, less balance from account of Dec. 1, 1866,.....	85 38
713	April 22	E. B. Millar, .....	Farm House acc't, 1866,..... \$158 92	
			" " 1867, cur exp., 95 82	
			" " furniture,..... 4 71	
			" Department, oil, &c.,..... 2 25	261 70
714	April 22	S. R. Greene,.....	Lock and key, P. O. box, .....	4 50
715	" 22	Charles Rich,.....	Board Expenses, .....	30 40
716	" 22	D. Carpenter, .....	" " .....	57 06
717	" 22	J. Gage,.....	" " .....	48 94
718	" 22	A. C. Prutzman,...	" " .....	35 32
719	" 22	" " ...	" " .....	19 53
720	" 22	H. G. Wells, .....	" " .....	34 90
721	" 22	R. C. Kedzie,.....	To build kitchen, .....	100 00
722	" 22	G. T. Fairchild,....	Salary, .....	100 00
723	" 22	A. T. Cook, .....	" .....	250 00
724	" 23	O. Clute,.....	" .....	379 76

REPORT OF THE SECRETARY OF THE  
WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
725	April 23	Camp, Winters, & Co.,	Boarding Hall Carpet,.....	\$43 05
726	" 23	S. Howard,.....	Salary, .....	83 33
727	" 23	A. F. Allen,.....	Farm House,.....	50 00
728	" 23	T. C. Abbot,.....	Advertising bills,.....	15 47
729	" 24	E. B. Miller, .....	Farm House,..... \$9 51	
			Farm, pails, .....	1 05
			" oil, .....	1 00
730	" 24	S. R. Greene,.....	Boxes for Reports, .....	12 30
			Table for Secretary's office,.....	5 50
731	" 24	Grove & Whitney,.	Hardware bills:	
			Farm Department, 1866,.....	\$315 28
			" " 1867, .....	64 49
			Horticultural Department, 1866, .....	75 00
			" " 1867, .....	5 10
			Boarding Hall, 1866,.....	12 15
			" " 1867,.....	3 45
			Buildings and furniture,.....	1 80
			Charged to private acc't,.....	2 40
732	April 24	S. Howard, .....	Expenditure as Sec'y. See 769,.....	75 00
733	" 29	S. S. Rockwell,....	Boarding Hall, .....	125 00
734	" 29	M. Miles, .....	Farm Department, .....	216 99
735	" 29	" .....	Salary, .....	100 00
736	May 6	A. F. Allen,.....	Farm House,.....	75 00
737	" 6	" " .....	Salary, .....	25 00
738	" 6	A. Bertch,.....	Boarding Hall, meat,.....	256 84
739	" 8	A. N. Prentiss, ....	Horticultural Department,.....	86 70
740	" 10	M. Miles, .....	Farm Department, .....	258 28
741	" 10	Knott & Beamer, ..	Boarding Hall, flour,.....	277 04
742	" 13	R. C. Kedzie,.....	Salary, .....	100 00
743	" 21	A. F. Allen,.....	Farm House,.....	8 52
744	" 22	S. S. Rockwell,....	Boarding Hall, .....	116 61
745	" 26	R. C. Kedzie, ....	Chemical Laboratory,.....	160 00
746	" 29	O. Horsford, .....	Board Expenses, .....	10 00
747	" 31	T. C. Abbot,.....	Salary, .....	156 25

## WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
743	May 31	J. Gage, .....	Board Expenses, .....	\$14 55
749	" 31	A. Bertch, .....	Farm House, meat, .....	20 77
750	" 31	Grove & Whitney, ..	Horticultural Dep't, hardware, 1866, ....	7 20
751	" 31	R. C. Kedzie, .....	Salary, .....	212 50
752	" 31	M. Miles, .....	" .....	212 50
753	June 3	A. Bertch, .....	Boarding Hall, meat, .....	259 41
754	" 3	Stephens & Co., ...	" " .....	182 43
755	" 3	Emselstyn & Sons, ..	" " .....	112 26
756	" 3	Sprang & Clark, ...	" " wagon, .....	175 00
757	" 3	S. S. Rockwell, ....	Salary, .....	137 50
758	" 3	A. F. Allen, .....	Farm House, .....	94 25
759	" 3	" " .....	" .....	100 80
760	" 3	" " .....	" .....	65 57
761	" 3	" " .....	Salary, .....	75 00
762	" 3	D. Benninghoff, ...	Farm Departm't. Yoke of oxen, .....	225 00
763	" 3	G. T. Fairchild, ....	Salary, .....	212 50
764	" 4	Knott & Beamer, ...	Boarding Hall, flour, .....	160 08
765	" 4	G. N. Walker, .....	" " groceries, .....	123 00
766	" 4	A. N. Prentiss, ....	Salary, .....	312 50
767	" 4	A. J. Cook, .....	" .....	166 67
768	" 4	W. W. Daniels, ....	" .....	100 00
769	" 12	S. Howard, .....	Postage and Stationery, .....	\$18 17
			Mich. Report, engraving, .....	40 35
			Other Reports, .....	8 03
			Travelling expenses, .....	60 77
			Other Expenses of office, .....	13 47
			To new acc't (See 732), .....	34 21
				100 00
770	June 14	S. S. Rockwell, ....	Boarding Hall, .....	154 93
771	" 15	C. C. Darling, .....	New road, .....	100 00
772	" 25	T. C. Abbot, .....	Salary, .....	156 25
773	" 26	M. Miles, .....	" .....	100 00
774	" 26	R. C. Kedzie, .....	" .....	100 00
775	" 27	S. S. Rockwell, ....	Boarding Hall, .....	150 90
776	" 27	G. T. Fairchild, ....	Salary, .....	100 00



REPORT OF THE SECRETARY OF THE  
WARRANT ACCOUNT—CONTINUED.

Number.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
777	July 2	S. R. Greene, .....	Library, shelves, .....	\$34 45
778	" 2	F. Raymond, .....	" books, .....	275 00
779	" 2	T. C. Abbot, .....	Salary, .....	312 50
780	" 2	C. C. Darling, .....	New road, in full, .....	105 50
781	" 2	M. Miles, .....	Farm Department, .....	562 29
782	" 3	A. F. Allen, .....	Salary, .....	30 00
783	" 3	A. N. Prentiss, ....	Horticultural Department, .....	41 64
784	" 3	" " ....	" " .....	100 00
785	" 3	" " ....	" " .....	25 00
786	" 3	" " ....	" " .....	65 00
787	" 3	" " ....	" " .....	100 00
788	" 6	S. Howard, .....	Salary, .....	125 00
789	" 6	M. Miles, .....	Farm Department, .....	200 00
790	" 8	T. C. Abbot, .....	Board Expenses, ..... \$0 25	
			Office Expenses, ..... 4 15	
			Postage, ..... 2 00	
			Library, ..... 1 65	
			Farm Department, ..... 3 57	11 63
791	July 8	S. S. Rockwell, ....	Boarding Hall, .....	950 00
792	" 8	G. W. Harrison, ....	Salary, .....	23 00
793	" 8	M. Miles, .....	" .....	100 00
794	" 8	A. F. Allen, .....	Farm House, .....	50 00
795	Aug. 30	A. J. Cook, .....	Salary, .....	100 00
796	" 30	R. C. Kedzie, .....	" .....	100 00
797	" 30	G. W. Harrison, ...	" .....	20 00
798	" 31	M. Miles, .....	" .....	112 50
799	" 31	R. C. Kedzie, .....	" .....	112 50
800	" 31	G. T. Fairchild, ....	" .....	212 50
801	" 31	" " ....	Barn, .....	50 00
802	" 31	A. N. Prentiss, ....	Salary, .....	312 50
803	" 31	A. J. Cook, .....	" .....	150 00
804	" 31	M. Miles, .....	Farm Department, .....	328 23
805	" 31	S. S. Rockwell, ....	Boarding Hall, .....	1,200 00
806	Sept. 2	J. Gage, .....	Board Expenses, .....	11 50

## WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
807 <sup>a</sup>	Sept. 2	T. C. Abbot,.....	Salary, .....	\$200 00
807 <sup>b</sup>	" 3	M. Miles, .....	Farm Department, .....	250 00
808	" 3	S. Howard, .....	Salary, .....	41 67
809	" 3	S. S. Rockwell,....	Boarding Hall, .....	180 29
810	" 3	" " ....	Salary, .....	187 50
811	" 3	A. F. Allen,.....	" .....	70 00
812	" 7	M. Miles, .....	Farm Department, .....	200 00
813	" 9	G. W. Harrison,....	Salary, .....	42 00
814	" 14	J. Gage, .....	Board Expenses, .....	12 20
815	" 24	A. N. Prentiss,....	Horticultural Department,.....	69 86
816	" 24	" " ....	" " .....	4 08
817	" 24	" " ....	" " .....	68 11
818	" 24	W. W. Daniels,...	Salary, .....	180 00
819	" 30	S. S. Rockwell,....	Boarding Hall, .....	144 78
820	Oct. 5	R. C. Kedzie,.....	Salary, .....	100 00
821	" 7	S. S. Rockwell,....	Boarding Hall, .....	26 80
822	" 7	" " ....	" " .....	104 08
823	" 7	" " ....	" " .....	100 09
824	" 8	S. Howard, .....	Salary, .....	61 67
825	" 10	A. N. Prentiss, ....	Greenhouse, .....	1,000 00
826	" 12	M. Miles, .....	Farm Department, .....	386 76
827	" 12	" .....	Salary, .....	150 00
828	" 14	G. W. Harrison,...	" .....	35 00
829	" 14	T. C. Abbot, .....	" .....	200 00
830 <sup>a</sup>	" 14	A. J. Cook, .....	" .....	100 00
830 <sup>b</sup>	" 14	R. C. Kedzie,.....	Chemical Laboratory,.....	32 00
831	" 16	S. S. Rockwell,....	Boarding Hall,.....	312 02
832	" 18	G. T. Fairchild,....	Salary, .....	100 00
833	" 22	S. Howard, .....	Board Expenses,.....	\$12 40
			Travelling Expenses,.....	22 65
			Postage, .....	5 84
			Exchange of Reports, .....	3 55
			To new acc't, .....	55 27
				59 21
834	Oct. 23	A. F. Allen, .....	Salary, .....	30 00

REPORT OF THE SECRETARY OF THE  
WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
835	Oct. 23	S. S. Rockwell,....	Boarding Hall, .....	\$ 83 20
836	" 23	" " .....	" " .....	150 00
837	" 29	Lansing & Son,....	Farm Department, blacksmith work,....	50 00
838	" 30	R. C. Kedzie, .....	Chemical Laboratory,.....	3 54
839	" 30	" " .....	Junior Exhibition, .....	7 50
840	" 30	Grove & Whitney,.	Hardware bills: Farm Department,.....\$180 07 " House,..... 5 75 Horticult. Department,..... 20 10 Buildings and Furniture, ..... 13 89	109 81
841	Oct. 30	M. Miles, .....	Farm Department, .....	400 00
842	" 30	" .....	" House Furniture,..... \$ 1 10 " " current exp.,..... 261 23	263 33
843	" 30	M. Miles, .....	" Department, .....	202 40
844	" 30	R. C. Kedzie, .....	Salary, .....	100 00
845	" 30	" " .....	Chemical Laboratory,.....	8 54
846	" 30	S. S. Rockwell,....	Boarding Hall, .....	1,200 00
847	Nov. 2	S. Howard, .....	Salary, .....	21 67
848	" 7	A. N. Prentiss,....	Horticultural Department, .....	68 33
849	" 7	" " .....	Greenhouse (to build,).....	1,000 00
850	" 9	R. C. Kedzie,.....	Salary in full to Dec. 1, .....	175 00
851	" 9	T. C. Abbot, .....	" " " .....	162 50
852	" 9	M. Miles, .....	" " " .....	235 00
853	" 9	A. N. Prentiss,....	" " " .....	354 16
854	" 9	G. T. Fairchild, ...	" " " .....	254 16
855	" 9	A. J. Cook,.....	" " " .....	150 00
856	" 9	W. W. Daniels,...	" " " .....	311 67
857	" 9	S. Howard, .....	" " " .....	41 66
858	" 9	S. S. Rockwell,....	" " " .....	137 50
859	" 9	A. F. Allen,.....	" " " .....	70 00
860	" 12	M. Miles, .....	Farm Department, .....	429 06
861	" 14	S. R. Greene,.....	Boxes for Reports, ..... \$40 00 Work in Chemical Laboratory, .. 8 00	48 00

## WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
863	Nov. 14	T. C. Abbot, .....	Expenses of Board:	
			O. Hosford, ..... \$30 00	
			D. Carpenter, ..... 37 60	
			S. O. Knapp, ..... 35 70	
			H. G. Wells, ..... 64 20	
			A. C. Prutzman, ..... 45 80	\$212 80
863	Nov. 20	A. F. Allen, .....	Farm House, current expenses, .....	34 98
864	" 20	D. L. Case, Exec'r,	Rent of office 1 year, ending July 30, '67,	150 00
865	" 20	T. C. Abbot, .....	Refunded to Student, ..... \$12 08	
			Postage stamps, ..... 10 50	
			Ink, ..... 1 25	
			Ribbon (Diplomas), ..... 2 25	
			Office Expenses, ..... 5 65	
			Boarding Hall, mending chair, ... 6 00	35 31
866	Nov. 21	G. W. Harrison, ...	Services as Ass't Foreman, in full, .....	22 36
867	" 23	S. S. Rockwell, ....	Boarding Hall, ..... 63 00	
868	" 23	Sanford Howard, ..	Devon Bull, Prince of Wales, .....	400 00
869	" 26	M. Miles, .....	Farm Department, ..... 400 00	
870	" 30	S. S. Rockwell, ....	Boarding Hall, ..... 218 11	
871	" 30	John A. Kerr & Co.,	Catalogues for 1867, ..... \$181 22	
			Printing for Sec'y's Office at Col., 14 00	
			" " Herbarium, ..... 9 00	
			Binding for Library, ..... 40 50	194 72
Total, .....				\$35,278 00

REPORT OF THE SECRETARY OF THE  
WARRANT ACCOUNT—CONTINUED.

NUMBER.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
835	Oct. 23	S. S. Rockwell,....	Boarding Hall, .....	\$ 83 30
836	" 23	" " .....	" " .....	150 00
837	" 29	Lansing & Son,....	Farm Department, blacksmith work,....	50 00
838	" 30	R. C. Kedzie, .....	Chemical Laboratory,.....	3 54
839	" 30	" " .....	Junior Exhibition, .....	7 50
840	" 30	Grove & Whitney,.	Hardware bills: Farm Department,.....\$130 07 " House,..... 5 75 Horticult. Department,..... 20 10 Buildings and Furniture, ..... 13 89	169 81
841	Oct. 30	M. Miles, .....	Farm Department, .....	400 00
842	" 30	" .....	" House Furniture,..... \$ 1 10 " " current exp.,..... 261 23	263 33
843	" 30	M. Miles, .....	" Department, .....	302 40
844	" 30	R. C. Kedzie, .....	Salary, .....	100 00
845	" 30	" " .....	Chemical Laboratory,.....	8 54
846	" 30	S. S. Rockwell,....	Boarding Hall, .....	1,200 00
847	Nov. 2	S. Howard, .....	Salary, .....	21 67
848	" 7	A. N. Prentiss,....	Horticultural Department, .....	68 33
849	" 7	" " .....	Greenhouse (to build,).....	1,000 00
850	" 9	R. C. Kedzie,....	Salary in full to Dec. 1, .....	175 00
851	" 9	T. C. Abbot, .....	" " " .....	162 50
852	" 9	M. Miles, .....	" " " .....	225 00
853	" 9	A. N. Prentiss,....	" " " .....	354 16
854	" 9	G. T. Fairchild, ...	" " " .....	254 16
855	" 9	A. J. Cook,.....	" " " .....	150 00
856	" 9	W. W. Daniels,...	" " " .....	311 67
857	" 9	S. Howard, .....	" " " .....	41 06
858	" 9	S. S. Rockwell,....	" " " .....	137 50
859	" 9	A. F. Allen,.....	" " " .....	70 00
860	" 12	M. Miles, .....	Farm Department, .....	429 06
861	" 14	S. R. Greene,.....	Boxes for Reports, ..... \$40 00 Work in Chemical Laboratory, .. 8 00	43 00

## WARRANT ACCOUNT—CONTINUED.

Number.	DATE.	TO WHOM DRAWN.	OBJECT.	AMOUNT.
862	Nov. 14	T. C. Abbot, .....	Expenses of Board: O. Hostford, ..... \$30 00 D. Carpenter, ..... 37 60 S. O. Knapp, ..... 35 70 H. G. Wells, ..... 64 20 A. C. Prutzman, ..... 45 80	\$215 30
863	Nov. 20	A. F. Allen, .....	Farm House, current expenses, .....	34 96
864	" 20	D. L. Case, Exec'r,	Rent of office 1 year, ending July 30, '87,	150 00
865	" 20	T. C. Abbot, .....	Refunded to Student, ..... \$12 06 Postage stamps, ..... 10 50 Ink, ..... 1 25 Ribbon (Diplomas), ..... 2 25 Office Expenses, ..... 5 65 Boarding Hall, mending chair, ... 6 00	33 31
866	Nov. 21	G. W. Harrison, ...	Services as Asst Foreman, in full, .....	32 85
867	" 23	S. S. Rockwell, ....	Boarding Hall, .....	63 00
868	" 23	Sanford Howard, ..	Devon Bull, Prince of Wales, .....	400 00
869	" 26	M. Miles, .....	Farm Department, .....	400 00
870	" 30	S. S. Rockwell, ....	Boarding Hall, .....	218 11
871	" 30	John A. Kerr & Co.,	Catalogues for 1887, ..... \$181 22 Printing for Sec'y's Office at Col., 14 00 " " Herbarium, ..... 9 00 Binding for Library, ..... 40 50	194 72
Total, .....				\$35,278 09

## SUMMARY OF WARRANT ACCOUNT.

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Expenses of Board of Agriculture, .....	\$ 566 24
Salaries of 1866, .....	1,556 84
"    1867, to Dec. 1, .....	10,543 26
Secretary Howard's office expenses, reports, traveling expenses, &c., .....	628 48
Farm Department, including Swamp Land management, is charged with, for 1866, .....	278 45
"    1867, .....	5,663 36
Horticultural Department is charged with, for 1866, .....	61 83
"    "    "    "    1867, .....	783 92
Boarding Hall, 1866, .....	126 20
"    1867, current expenses, .....	8,938 76
"    furniture, .....	727 96
Farm House, current expenses, .....	1,071 26
"    furniture, .....	117 08
"    permanent improvements, .....	45 50
"    cash on hand, .....	41 27
Chemical Laboratory, .....	214 58
Library and Text books, .....	798 60
Secretary's office at College, printing Catalogue for 1866 and 1867, advertising, &c., .....	350 70
Buildings and furniture, .....	10 18
Museum, .....	53 75
Dwelling house, new kitchen, barn, &c., .....	151 44
New road, .....	205 50
Green-house and Garden barn, .....	2,000 00
Ditching in Lawn, (from Farm act.,) .....	5 00
Cash on hand, Farm Department, .....	200 00
Returned to students, or re-charged to private acc't, miscellaneous, or unclassified, .....	122 95
	<u><u>\$35,278 09</u></u>

## SUMMARY OF CASH ACCOUNT

*Of Superintendent of the Agricultural College Farm, for the year ending  
December 1st, 1867.*

## RECEIPTS.

Warrants, .....	\$5,800 01
Sales of stock, .....	688 39
Other produce, .....	91 45
Sales of Swamp Lands, .....	178 50
From Jacob Bennett, for ditching, .....	55 00
	<hr/>
	\$6,813 35

## EXPENDITURES.

Paid for ditching on "Big Marsh," .....	\$1,151 56
" " College Farm, .....	139 65
" " Sec. 25, Lansing, .....	96 25
" " Sec. 12, Bath, .....	30 00
" for grass seed for "Big Marsh," .....	163 70
" to Sec'y, Swamp Land Receipts, .....	178 50
" " Farm " .....	779 84
" for work, .....	844 77
" for improvements and repairs, .....	575 27
" for feed, .....	944 23
" for lumber, .....	268 54
" on account of stock, .....	279 42
" for seeds, .....	101 63
" for cord wood, (chopping,) .....	98 76
" for permanent improvements, .....	75 70
" for splitting rails, .....	49 28
" for Farm House, .....	403 47
" for College, .....	40 90
" personal expenses at Lansing, .....	20 55
" for hardware, (nails, hinges, &c.), .....	12 46
" for harness and harness repairs, .....	72 88
" expenses of stock at fairs, .....	85 17
" for Boarding Hall, (getting ice,) .....	1 25
" for Horticultural Department, .....	48 57
" on account of Experiments, .....	33 74



Paid office expenses, .....	\$27 95
" for repairs on wood machine, .....	41 50
"       "       "       "       1866, .....	22 50
" for plaster, .....	10 25
" for cleaning out well, .....	1 50
" for salt, .....	11 50
" for toll, .....	2 01
Cash on hand for current expenses, .....	200 00
	<hr/>
	<u>\$6,813 35</u>

## TREASURER'S REPORT.

*Joseph Mills, Treasurer, in account with State Board of Agriculture.*

DR.

1866.

Dec. 13. To cash of Sanford Howard, Secretary,..... \$1,143 03

1867.

Jan'y 28.	"	"	"	500 00
March 2.	"	"	"	670 00
" 8.	"	"	"	437 37
" 21.	"	State Treasurer,		5,000 00
" 29.	"	Sanford Howard, Secretary,		1,381 06
April 5.	"	"	"	100 00
" 6.	"	"	"	475 00
" 19.	"	State Treasurer,		5,000 00
" 26.	"	Sanford Howard, Secretary,		147 15
May 18.	"	"	"	200 43
" 30.	"	State Treasurer,		5,000 00
" 31.	"	S. Howard, Secretary,		364 95
June 5.	"	"	"	246 80
" 8.	"	"	"	165 00
" 14.	"	"	"	235 00
" 21.	"	"	"	87 07
" 27.	"	"	"	313 37
July 13.	"	"	"	212 26
" 20.	"	"	"	245 00
Aug. 1.	"	"	"	109 25
" 8.	"	"	"	130 00
" 17.	"	"	"	85 00
" 29.	"	"	"	91 75
" 29.	"	State Treasurer,		5,000 00
Sept. 14.	"	S. Howard, Secretary,		59 35
" 19.	"	"	"	4,964 00
" 28.	"	"	"	86 16
Oct. 1.	"	"	"	160 00

## REPORT OF THE SECRETARY OF THE

Oct.	5.	To Cash of S. Howard, Secretary,.....	\$1,000 00
"	7.	" " " " .....	1,000 00
"	8.	" " " " .....	140 00
"	11.	" " " " .....	113 92
"	19.	" " " " .....	140 00
"	26.	" " " " .....	418 25
Nov.	2.	" " " " .....	150 00
"	30.	" " " " .....	229 62
Total,.....			<u>\$35,800 79</u>

## CR.

1866.

Dec.	1.	By balance from old account,.....	*\$382 49
"	13.	By paid warrant No. 647,.....	539 07
"	13.	" " 648,.....	9 88
"	13.	" " 649,.....	150 00
"	13.	" " 650,.....	5 52
"	13.	" " 651,.....	5 00
"	13.	" " 652,.....	20 13
"	13.	" " 653,.....	9 50
"	13.	" " 654,.....	21 44

1867.

Jan'y	28.	By paid warrant No. 655,.....	100 00
"	28.	" " 656,.....	100 00
"	28.	" " 657, .....	100 00
"	28.	" " 658,.....	200 00
Mar.	5.	" " 659,.....	320 00
"	9.	" " 660,.....	150 00
"	15.	" " 661,.....	100 00
"	21.	" " 662,.....	368 75
"	21.	" " 663,.....	312 50
"	21.	" " 664,.....	212 50
"	21.	" " 665,.....	150 00
"	21.	" " 666,.....	100 00
"	21.	" " 667, .....	83 33
"	22.	" " 668,.....	468 75
"	22.	" " 669,.....	312 50
"	22.	" " 670,.....	312 50
"	22.	" " 671,.....	312 50
"	22.	" " 672,.....	312 50
"	22.	" " 673,.....	125 00
"	22.	" " 674,.....	100 00

\*By a typographical error, this balance was printed in the Report of last year, \$384 49.

## STATE BOARD OF AGRICULTURE.

33

Mar.	22.	By paid warrant No. 675,.....	\$137 50
"	22.	" 676,.....	100 00
"	22.	" 677,.....	110 00
"	22.	" 678,.....	400 00
"	26.	" 679,.....	25 00
"	26.	" 680,.....	50 00
"	28.	" 681,.....	18 88
"	29.	" 682,.....	150 00
"	29.	" 683,.....	100 00
April	1.	" 684,.....	50 00
"	1.	" 685,.....	13 23
"	1.	" 686,.....	12 88
"	2.	" 687,.....	24 03
"	2.	" 688,.....	200 00
"	2.	" 689,.....	150 00
"	2.	" 690,.....	729 88
"	2.	" 691,.....	200 00
"	8.	" 692,.....	891 46
"	8.	" 693,.....	40 51
"	8.	" 694,.....	128 21
"	8.	" 695,.....	62 29
"	8.	" 696,.....	100 00
"	8.	" 697,.....	34 80
"	8.	" 698,.....	40 00
"	8.	" 699,.....	212 50
"	8.	" 700,.....	129 00
"	8.	" 701,.....	241 31
"	8.	" 702,.....	84 45
"	8.	" 703,.....	50 00
"	8.	" 704,.....	140 20
"	8.	" 705,.....	26 83
"	8.	" 706,.....	65 00
"	22.	" 707,.....	41 36
"	22.	" 708,.....	60 01
"	22.	" 709,.....	92 82
"	22.	" 710,.....	95 17
"	22.	" 711,.....	8 38
"	22.	" 712,.....	85 38
"	22.	" 713,.....	261 70
"	22.	" 714,.....	4 50
"	22.	" 715,.....	39 40
"	22.	" 716,.....	57 05
"	22.	" 717,.....	48 94
"	22.	" 718,.....	35 32

April 22.	By paid warrant No. 719,	\$19 53
" 22.	" " " 720,	34 90
" 22.	" " " 721,	100 00
" 22.	" " " 722,	100 00
" 22.	" " " 723,	250 00
" 23.	" " " 724,	379 76
" 23.	" " " 725,	48 05
" 23.	" " " 726,	83 33
" 23.	" " " 727,	50 00
" 24.	" " " 728,	\$15 47
" 24.	" " " 729,	11 56
" 24.	" " " 730,	17 80
" 24.	" " " 731,	479 67
" 24.	" " " 732,	75 00
" 29.	" " " 733,	125 00
" 29.	" " " 734,	216 99
" 29.	" " " 735,	100 00
May 6.	" " " 736,	75 00
" 6.	" " " 737,	25 00
" 6.	" " " 738,	256 84
" 8.	" " " 739,	86 70
" 10.	" " " 740,	258 26
" 10.	" " " 741,	277 04
" 10.	" " " 742,	100 00
" 10.	" " " 743,	8 52
" 10.	" " " 744,	116 61
" 28.	" " " 745,	160 00
" 29.	" " " 746,	10 00
" 31.	" " " 747,	156 25
" 31.	" " " 748,	14 55
" 31.	" " " 749,	30 77
" 31.	" " " 750,	7 20
" 31.	" " " 751,	212 50
" 31.	" " " 752,	212 50
June 3.	" " " 753,	259 41
" 3.	" " " 754,	182 48
" 3.	" " " 755,	112 26
" 3.	" " " 756,	175 00
" 3.	" " " 757,	37 50
" 3.	" " " 758,	94 35
" 3.	" " " 759,	100 80
" 3.	" " " 760,	65 57
" 3.	" " " 761,	75 00
" 3.	" " " 762,	225 00

June	3.	By paid warrant No. 763,	\$212 50
"	4.	" " " 764,	160 63
"	4.	" " " 765,	123 00
"	4.	" " " 766,	312 50
"	4.	" " " 767,	166 67
"	4.	" " " 768,	100 00
"	12.	" " " 769,	100 00
"	14.	" " " 770,	154 93
June	15.	" " " 771,	100 00
"	25.	" " " 772,	156 25
"	26.	" " " 773,	100 00
"	26.	" " " 774,	100 00
"	27.	" " " 775,	150 00
"	27.	" " " 776,	100 00
July	2.	" " " 777,	34 45
"	2.	" " " 778,	275 00
"	2.	" " " 779,	312 50
"	2.	" " " 780,	105 50
"	2.	" " " 781,	562 29
"	2.	" " " 782,	30 00
"	2.	" " " 783,	41 64
"	2.	" " " 784,	100 00
"	2.	" " " 785,	25 00
"	2.	" " " 786,	65 00
"	2.	" " " 787,	100 00
"	6.	" " " 788,	125 00
"	2.	" " " [789,] 788,	200 00
"	8.	" " " 790,	11 62
"	8.	" " " 791,	950 00
"	8.	" " " 792,	28 00
"	8.	" " " 793,	100 00
"	8.	" " " 794,	50 00
Aug.	30.	" " " 795,	100 00
"	31.	" " " 796,	100 00
"	31.	" " " 797,	20 00
"	31.	" " " 798,	112 50
"	31.	" " " 799,	112 50
"	31.	" " " 800,	212 50
"	31.	" " " 801,	50 00
"	31.	" " " 802,	312 50
"	31.	" " " 803,	150 00
"	31.	" " " 804,	328 33
Sept.	2.	" " " 805,	1,200 00
"	2.	" " " 806,	11 50

## REPORT OF THE SECRETARY OF THE

Sept.	2.	By paid warrant No. 807, a,.....	\$200 00
"	3.	" " " 807, b, .....	250 00
"	3.	" " " 808,.....	41 67
"	3.	" " " 809,.....	130 29
"	3.	" " " 810,.....	137 50
"	3.	" " " 811,.....	70 00
"	7.	" " " 812,.....	200 00
"	9.	" " " 813,.....	42 00
"	14.	" " " 814,.....	12 20
"	24.	" " " 815,.....	69 86
"	24.	" " " 816,.....	4 08
"	24.	" " " 817,.....	68 11
"	24.	" " " 818,.....	130 00
"	30.	" " " 819,.....	144 75
Oct.	5.	" " " 820,.....	100 00
"	7.	" " " 821,.....	26 50
"	7.	" " " 822,.....	104 03
"	7.	" " " 823,.....	100 00
"	8.	" " " 824,.....	61 67
"	10.	" " " 825,.....	1,000 00
"	12.	" " " 826,.....	386 76
"	12.	" " " 827,.....	150 00
"	14.	" " " 828,.....	35 00
"	14.	" " " 829,.....	200 00
"	14.	" " " 830, a, .....	100 00
"	14.	" " " 830, b, .....	32 00
"	16.	" " " 831,.....	312 02
"	18.	" " " 832,.....	100 00
"	22.	" " " 833, .....	25 00
"	23.	" " " 834,.....	30 00
"	23.	" " " 835,.....	83 20
"	23.	" " " 836,.....	150 00
"	29.	" " " 837,.....	50 00
"	30.	" " " 838,.....	3 54
"	30.	" " " 839,.....	7 50
"	30.	" " " 840,.....	169 81
"	30.	" " " 841,.....	400 00
"	30.	" " " 842,.....	262 33
"	30.	" " " 843,.....	202 40
"	30.	" " " 844,.....	100 00
"	30.	" " " 845,.....	8 54
Nov.	1.	" " " 846,.....	1,200 00
"	2.	" " " 847,.....	21 67
"	7.	" " " 848, .....	68 33

Nov. 9.	By paid warrant No. 849, .....	\$1,000 00
" 9.	" " " 850, .....	175 00
" 9.	" " " 851, .....	162 50
" 9.	" " " 852, .....	225 00
" 9.	" " " 853, .....	354 16
" 9.	" " " 854, .....	254 16
" 7.	" " " 855, .....	150 00
" 9.	" " " 856, .....	311 67
" 9.	" " " 857, .....	41 66
" 12.	" " " 860, .....	429 06
" 14.	" " " 861, .....	48 00
" 14.	" " " 862, .....	213 30
" 20.	" " " 863, .....	4 98
" 20.	" " " 864, .....	150 00
" 20.	" " " 865, .....	38 31
" 21.	" " " 866, .....	32 85
" 23.	" " " 867, .....	63 00
" 23.	" " " 868, .....	400 00
" 26.	" " " 869, .....	400 00
Total, .....		<u>\$35,800 79</u>

Respectfully submitted.

JOSEPH MILLS, *Treasurer.*

LANSING, December 1, 1867.





## EXPERIMENTS IN PRACTICAL AGRICULTURE.

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*To the President of the State Agricultural College :*

The following report on experiments conducted in the Department of Practical Agriculture during the past year, is respectfully presented:

### SHEEP-FEEDING.

In the south end of the sheep barn, six enclosures of uniform size were made, with boxes and feeding-troughs, so arranged as to prevent any waste of the feed under experiment. The Pens were numbered, and on the 13th of December, 1866, sheep were placed in them as follows:

*Pen No. 1.* Two grade Merino wether lambs. The prescribed feed consisted of a limited amount of corn, with as much "chaffed" hay as they would eat.

*Pen No. 2.* Two grade Merino wether lambs. Limited feed, roots—hay as in Pen No. 1.

*Pen No. 3.* Two yearling South Down wethers. Limited feed, corn—hay as in Pen No. 1.

*Pen No. 4.* Two grade South Down wethers, one a yearling, the other a lamb. Limited feed, roots—hay as in Pen No. 1.

*Pen No. 5.* Two grade Cotswold wether lambs. Limited feed, corn—hay as in Pen No. 1.

*Pen No. 6.* Two grade Cotswold wether lambs. Limited feed, roots—hay as in Pen No. 1.

The sheep were selected with reference to uniformity in the representations of each breed, in form, size and condition. In Pens No. 1, 2, 5 and 6 the selections were quite satisfactory. In Pens No. 3 and 4 from the limited number to select from, uni-

formity could not be attained, and the progress of the experiment showed most of the animals in these pens to be poor feeders.

The feed was all carefully weighed at feeding time, and all waste was particularly guarded against. The roots fed up to and including the fourteenth week of the experiment were the variety known as Skirving's Improved Swede turnip. At the commencement of the fifteenth week, beets were substituted for the remaining eight weeks of the experiment. The hay fed was a mixture of clover and timothy. The sheep in each pen were distinguished by the numbers, 1 and 2.

When put in the pens, December 13th, the weights were as follows:

PEN No. 1.	PEN No. 2.	PEN No. 3.	PEN No. 4.	PEN No. 5.	PEN No. 6.
1. 70.00 lbs.	1. 56.00 lbs.	1. 104.50 lbs.	1. 86.50 lbs.	1. 86.00 lbs.	1. 85.50 lbs.
2. 55.50 "	2. 56.00 "	2. 74.00 "	2. 72.00 "	2. 72.00 "	2. 76.00 "
125.50	112.00	178.50	170.50	158.00	161.50

For several weeks before the commencement of the experiment, the sheep selected were kept in a flock by themselves, their feed after leaving the pasture, consisting exclusively of hay—clover and timothy.

At the close of each week, the sheep were carefully weighed in the morning, fasting, and to prevent any variation from drinking, the water buckets were removed from the pens the previous night.

The following table, No. 1, shows the weight of each sheep at the close of each week of the experiment. The weights are given in pounds and decimals of a pound:

TABLE No. 1.

WEIGHT OF SHEEP AT CLOSE OF EACH WEEK.

WEEK.	PEN No. 1.	PEN No. 2.	PEN No. 3.	PEN No. 4.	PEN No. 5.	PEN No. 6.
1st,.....	No. 1. 67.50 2. 55.25 122.75	No. 1. 52.50 2. 53.75 106.25	No. 1. 102.50 2. 71.00 173.50	No. 1. 92.50 2. 66.50 159.00	No. 1. 80.00 2. 72.00 152.00	No. 1. 81.00 2. 72.50 153.50
2d,.....	1. 69.50 2. 54.50	1. 52.50 2. 53.00	1. 101.00 2. 70.00	1. 92.50 2. 66.00	1. 82.50 2. 72.00	1. 79.00 2. 70.00

## ERRATA.

On page 42, table 1, in the column for Pen No. 1, 8th week, second line, instead of figures 2. 54.50, read 2. 64.50.

On page 43, column for Pen No. 6, second line from the bottom, instead of figures 2. 106.00, read 2. 105.50.

On page 48, table 4, in column for Pen No. 5, hay, fourth line from the top, instead of figures 12.56, read 12.58.

On page 50, table 5, in column "Value of Feed," third line from the top, instead of \$6 3, read \$6 39. In column "Feed Consumed," last line (corn), instead of 362.76, read 362.75.

On page 51, in column "Feed Consumed for each 100 lbs. of live weight," last line, for "Boots," read Roots.

6th,.....	1. 76.00 2. 60.50 136.50	1. 54.50 2. 57.50 112.00	1. 109.50 2. 69.00 178.50	1. 97.50 2. 69.50 167.00	1. 93.00 2. 75.50 168.50	1. 86.50 2. 82.00 168.50
7th,.....	1. 76.50 2. 62.00 138.50	1. 55.50 2. 60.00 115.50	1. 108.00 2. 68.00 176.00	1. 93.00 2. 71.50 164.50	1. 95.50 2. 73.00 168.50	1. 86.50 2. 84.50 171.00

TABLE 1.—CONTINUED.

WEEK.	PEN No. 1.	PEN No. 2.	PEN No. 3.	PEN No. 4.	PEN No. 5.	PEN No. 6.
8th,.....	No. 1. 80.00	No. 1. 57.50	No. 1. 111.00	No. 1. 98.50	No. 1. 98.50	No. 1. 89.00
	2. 54.50	2. 62.00	2. 69.00	2. 72.50	2. 78.00	2. 87.50
	144.50	119.50	179.00	171.00	176.50	176.50
9th,.....	1. 81.50	1. 55.50	1. 111.00	1. 98.00	1. 103.00	1. 88.50
	2. 64.50	2. 61.00	2. 68.50	2. 72.00	2. 78.50	2. 87.00
	146.00	116.50	179.50	170.00	179.50	175.50
10th,.....	1. 85.00	1. 57.50	1. 116.00	1. 100.00	1. 107.50	1. 93.00
	2. 67.00	2. 63.50	2. 70.00	2. 71.00	2. 81.50	2. 85.50
	152.00	121.00	186.00	171.00	190.00	178.50
11th,.....	1. 80.00	1. 58.00	1. 114.00	1. 100.50	1. 109.00	1. 93.50
	2. 63.50	2. 64.00	2. 72.00	2. 71.50	2. 84.50	2. 90.00
	148.50	122.00	186.00	172.00	193.50	183.50
12th,.....	1. 86.50	1. 60.00	1. 118.00	1. 101.50	1. 114.00	1. 92.50
	2. 67.50	2. 63.00	2. 75.00	2. 72.00	2. 98.00	2. 86.00
	154.00	123.00	193.00	173.50	212.00	181.50
13th,.....	1. 87.00	1. 68.00	1. 120.00	1. 100.50	1. 119.00	1. 93.00
	2. 70.00	2. 63.00	2. 77.00	2. 71.00	2. 91.50	2. 86.00
	157.00	131.00	197.00	171.50	209.50	178.00
14th,.....	1. 95.50	1. 59.00	1. 124.00	1. 102.00	1. 116.50	1. 95.00
	2. 63.00	2. 63.50	2. 78.50	2. 72.50	2. 93.00	2. 91.00
	157.50	122.50	202.50	174.50	209.50	186.00
15th,.....	1. 92.50	1. 63.50	1. 125.00	1. 106.50	1. 121.00	1. 97.00
	2. 59.00	2. 64.50	2. 85.50	2. 75.00	2. 96.00	2. 92.50
	151.50	128.00	210.50	181.50	217.00	189.50

TABLE 1.—CONTINUED.

WEEK.	PEN No. 1.	PEN No. 2.	PEN No. 3.	PEN No. 4.	PEN No. 5.	PEN No. 6.
16th,.....	No. 1. 94.00 2. 62.00 156.00	No. 1. 65.50 2. 63.00 128.50	No. 1. 122.50 2. 81.00 203.50	No. 1. 107.00 2. 76.00 183.00	No. 1. 120.50 2. 98.50 219.00	No. 1. 95.00 2. 90.50 185.50
17th,.....	1. 94.00 2. 61.00 155.00	1. 62.00 2. 63.50 125.50	1. 126.00 2. 83.00 209.00	1. 106.50 2. 76.00 182.50	1. 125.00 2. 101.00 226.00	1. 98.50 2. 91.50 190.00
18th,.....	1. 96.50 2. 61.50 158.00	1. 64.00 2. 65.00 129.00	1. 125.50 2. 84.00 209.50	1. 106.50 2. 75.00 181.50	1. 124.00 2. 101.00 225.00	1. 100.00 2. 92.50 192.50
19th,.....	1. 95.00 2. 63.50 158.50	1. 64.50 2. 67.50 132.00	1. 129.00 2. 87.50 216.50	1. 106.50 2. 79.00 185.50	1. 124.00 2. 107.00 231.00	1. 102.50 2. 97.50 200.00
20th,.....	1. 92.50 2. 62.50 155.00	1. 63.50 2. 68.00 131.50	1. 128.50 2. 89.50 217.00	1. 106.00 2. 78.50 184.50	1. 123.00 2. 106.00 229.00	1. 102.50 2. 100.00 202.50
21st,.....	1. 96.00 2. 62.00 158.00	1. 63.50 2. 68.00 131.50	1. 125.00 2. 89.00 214.00	1. 106.00 2. 81.50 187.50	1. 123.50 2. 106.00 229.50	1. 107.50 2. 101.00 208.50
22d,.....	1. 98.50 2. 68.50 167.00	1. 62.50 2. 68.50 131.00	1. 125.00 2. 90.00 215.00	1. 106.00 2. 84.00 192.00	1. 116.00 2. 106.50 222.50	1. 110.50 2. 105.00 215.00

The amount of feed consumed in each pen, during each week of the experiment, is shown in Table No. 2.

TABLE 2.

AMOUNT OF FOOD CONSUMED IN EACH PEN FOR EACH WEEK OF THE EXPERIMENT.

WEEK.	PEN No. 1.		PEN No. 2.		PEN No. 3.		PEN No. 4.		PEN No. 5.		PEN No. 6.	
	Hay, lbs.	Corn, lbs.	Hay, lbs.	Corn, lbs.	Hay, lbs.	Roots, lbs.	Hay, lbs.	Roots, lbs.	Hay, lbs.	Corn, lbs.	Hay, lbs.	Roots, lbs.
1st, .....	16.81	1.31	10.23	5.06	14.67	1.75	14.47	6.75	13.91	1.75	15.53	6.75
2d, .....	21.56	5.25	11.47	25.00	17.42	7.00	16.06	35.00	16.69	7.00	17.66	35.00
3d, .....	22.63	5.25	13.20	25.25	19.45	7.00	21.50	35.00	19.23	7.00	24.37	35.00
4th, .....	18.53	10.50	13.00	52.50	14.34	14.00	17.13	70.00	19.97	14.00	21.25	70.00
5th, .....	22.44	10.50	14.23	52.50	15.59	14.00	19.47	70.00	22.00	14.00	23.88	70.00
6th, .....	23.63	10.50	16.47	52.50	17.15	14.00	23.06	70.00	23.06	14.00	23.06	70.00
7th, .....	23.63	10.50	17.38	52.50	16.00	14.00	25.38	70.00	20.84	14.00	29.56	70.00
8th, .....	22.70	10.50	15.53	52.50	13.56	14.00	22.56	70.00	19.63	14.00	25.50	70.00
9th, .....	22.56	10.50	16.70	52.50	14.50	14.00	23.25	70.00	23.10	14.00	24.75	70.00
10th, .....	20.75	14.00	16.51	70.00	13.06	21.00	18.03	105.00	20.97	21.00	19.83	105.00
11th, .....	16.44	14.00	15.47	70.00	8.38	21.00	13.97	105.00	21.13	21.00	21.66	105.00
12th, .....	14.50	14.00	12.94	70.00	8.50	21.00	13.13	105.00	20.50	21.00	21.75	105.00
13th, .....	11.19	14.00	9.25	70.00	8.94	21.00	9.63	105.00	22.19	21.00	13.99	105.00

14th, .....	7.69	14.00	7.69	70.00	10.25	21.00	9.76	106.00	20.33	21.00	15.13	105.00	14
15th, .....	6.25	9.00	8.75	70.00	8.25	21.00	12.06	105.00	21.50	21.00	18.13	105.00	15
16th, .....	9.76	13.00	9.76	70.00	6.69	16.50	10.50	105.00	19.69	21.00	16.19	105.00	16
17th, .....	8.75	12.50	7.33	70.00	9.50	19.00	8.81	105.00	18.75	19.00	16.13	105.00	17
18th, .....	7.69	13.50	7.00	70.00	8.00	20.50	7.13	105.00	17.81	21.00	16.38	105.00	18
19th, .....	9.75	14.00	7.69	E.	9.00	21.00	8.69	C.	14.31	21.00	15.63	D.	19
20th, .....	6.56	14.00	6.31	70.00	8.69	21.00	7.50	105.00	10.81	21.00	17.25	105.00	20
21st, .....	5.31	14.00	8.69	70.00	5.50	21.00	12.00	105.00	6.81	21.00	22.33	105.00	21
22d, .....	6.50	14.00	6.25	70.00	10.03	18.00	15.87	105.00	5.56	19.50	22.44	105.00	22



The 19th week, in Pens No. 2, 4 and 6, the limited food was varied as follows:

Pen No. 2, B—Turnips, 25 lbs.; beets, 25 lbs.; corn, 4 lbs.

“ “ 4, C— “ 37.5 lbs.; “ 37.5 lbs.; “ 6 “

“ “ 6, D— “ 37.5 lbs.; “ 37.5 “ “ 5.5 “

It will be observed that in Pen No. 1, the corn was not all eaten, from the 15th to the 18th week, inclusive.

This was the case also in Pen No. 3, during the 16th, 17th and 18th weeks, and in Pen No. 5, the 17th week.

The decrease in weight of sheep No. 2, in Pen 5, during the 6th and 7th weeks, was produced by “*scours*,” from which it had not entirely recovered the 8th week.

The average weight for the week, of the sheep in each pen, is given in Table No. 3.

This average weight is obtained by adding the weight at the beginning of the week to the weight at the close of the week, and dividing the sum by two.

It was observed by weighing animals at short intervals, that variations in weight occurred that could not be considered as indicating any indisposition or morbid derangement of the system.

These variations are undoubtedly produced by physiological conditions of the system, that may in fact be intimately connected with the maintenance of the standard of health.

It will be readily seen, for instance, that a change of temperature may produce an increased or diminished action of the kidneys and skin, that would produce within the limits of healthy action, a marked effect on the weight of the animal.

The average weight for the week will therefore better represent the real condition of the animal.

TABLE 3.

AVERAGE WEIGHT OF SHEEP IN EACH PEN FOR EACH WEEK OF EXPERIMENT.

WEEK.	PEN No. 1.	PEN No. 2.	PEN No. 3.	PEN No. 4.	PEN No. 5.	PEN No. 6.
1st,.....	124.13	109.13	176.00	164.25	165.00	157.50
2d,.....	123.88	105.88	172.25	158.25	158.50	154.25
3d,.....	125.00	105.25	169.50	158.25	154.75	155.25
4th,.....	128.00	107.00	172.25	160.25	158.75	157.50
5th,.....	131.25	109.25	175.00	162.50	164.00	160.18
6th,.....	134.50	110.75	176.00	164.75	167.00	160.63
7th,.....	137.50	113.75	177.25	168.25	168.50	160.75
8th,.....	141.50	117.50	177.50	170.25	172.50	170.38
9th,.....	145.25	118.00	179.25	170.50	178.00	176.00
10th,.....	149.00	118.75	182.75	170.50	184.75	177.00
11th,.....	150.25	121.50	186.00	171.50	191.75	181.00
12th,.....	151.25	127.00	189.50	172.75	202.75	182.50
13th,.....	155.50	131.50	195.00	172.50	210.75	179.75
14th,.....	157.25	126.75	199.75	173.00	209.50	182.00
15th,.....	154.50	125.25	206.50	178.00	213.25	187.75
16th,.....	153.75	128.25	207.00	182.25	218.00	187.50
17th,.....	155.50	127.00	206.25	182.75	222.50	187.75
18th,.....	156.50	127.25	209.25	182.00	225.50	191.25
19th,.....	158.25	130.50	213.00	183.00	228.00	196.25
20th,.....	156.75	131.75	216.75	184.00	230.00	201.25
21st,.....	156.50	131.50	215.50	185.00	227.75	205.50
22d,.....	160.00	131.25	214.50	189.25	226.00	212.25

Table No. 4, showing the average amount of feed consumed per week for each 100 lbs. of live weight, is formed from tables No. 2 and 3, by a simple proportion. Thus, in Pen No. 1, the amount of hay consumed the first week was 16.31 lbs. as shown in Table No. 2; the average weight of the sheep for the week, according to Table No. 3, was 124 13 lbs. Then 16.31 lbs. multiplied by 100, and divided by 124.13, gives 13.14 as the amount of hay consumed by each 100 lbs. of live weight.

In this table the change in the limited feed in Pens 2, 4 and 6, the 19th week of the experiment, is not noticed.

TABLE 4.

AVERAGE AMOUNT OF FOOD CONSUMED PER WEEK FOR EACH ONE HUNDRED POUNDS OF LIVE WEIGHT.

WEEK	Pens No. 1.		Pens No. 2.		Pens No. 3.		Pens No. 4.		Pens No. 5.		Pens No. 6.		
	Hay.	Corn.	Hay.	Roots.	Hay.	Roots.	Hay.	Roots.	Hay.	Corn.	Hay.	Roots.	
1st, .....	13.14	1.06	9.37	4.64	8.34	0.99	8.81	4.19	8.97	1.13	9.86	4.29	1
2d, .....	17.47	4.28	10.83	23.61	10.11	4.06	10.15	22.12	10.87	4.56	11.45	22.69	2
3d, .....	18.10	4.20	12.54	24.94	11.47	4.13	13.59	22.12	12.43	4.52	15.70	22.64	3
4th, .....	14.48	8.20	12.15	49.07	8.33	8.13	10.69	43.68	12.56	8.82	13.49	44.44	4
5th, .....	17.10	8.00	13.07	43.06	8.91	8.00	11.98	43.08	13.41	8.54	14.91	43.70	5
6th, .....	17.57	7.81	14.87	47.40	9.75	7.95	14.00	42.49	13.91	8.38	17.47	43.88	6
7th, .....	17.11	7.64	15.71	46.15	9.03	7.90	15.08	41.60	12.07	8.31	17.42	41.24	7
8th, .....	16.04	7.42	13.23	44.68	7.64	7.89	13.25	41.12	11.88	8.12	14.97	41.09	8
9th, .....	15.53	7.23	14.15	44.49	8.09	7.81	13.64	41.06	12.91	7.87	14.06	39.77	9
10th, .....	13.68	9.40	14.16	58.95	7.15	11.49	10.57	61.58	11.35	11.37	10.52	59.82	10
11th, .....	10.94	9.31	12.73	57.61	4.50	11.29	8.15	61.22	11.02	10.95	11.06	58.01	11
12th, .....	9.59	9.26	10.19	55.12	4.49	11.08	7.60	60.78	10.11	10.86	11.92	57.53	12
13th, .....	7.20	9.00	7.08	53.23	4.53	10.77	6.53	60.37	10.53	9.95	7.61	53.41	13

14th.....	4.89	8.90	6.06	55.23	5.13	10.31	5.64	60.69	9.73	10.02	8.31	57.69	14
15th.....	4.05	5.83	6.99	55.89	4.00	10.17	6.78	53.90	10.08	9.85	9.66	55.93	15
16th.....	6.85	8.46	7.61	54.53	3.23	7.97	5.76	57.61	9.03	9.63	8.63	56.00	16
17th.....	5.63	8.04	5.81	55.12	4.61	9.21	4.82	57.46	8.43	8.54	8.59	55.93	17
18th.....	4.91	8.83	5.50	55.01	3.82	9.80	3.91	57.60	7.68	9.31	8.56	54.90	18
19th.....	6.16	8.86	5.89	53.64	4.23	9.86	4.75	57.33	6.28	9.21	7.96	53.50	19
20th.....	4.19	8.93	4.79	53.13	4.01	9.69	4.08	57.07	4.70	9.13	8.57	52.17	20
21st.....	3.39	8.95	6.61	53.23	2.55	9.74	6.49	56.76	2.99	9.23	10.89	51.09	21
22d.....	4.06	8.75	4.76	53.33	4.95	8.39	3.39	55.43	2.46	8.63	10.57	49.47	22
Total.....	231.83	168.13	214.04	1,047.11	138.92	186.83	193.71	1,065.04	212.82	186.43	253.08	1,023.29	....

The results of the experiment in dollars and cents, are shown in Table No. 5. Hay is valued at \$12 per ton; corn at \$1 per bushel of 56 lbs.; roots, at 16 cents per bushel of 60 lbs.

The total amount of feed consumed for each 100 lbs. of live weight, and the cost of feed for each 100 lbs. of live weight, is also given.

**TABLE 5.**  
**RESULTS IN FEEDING SHEEP IN 1886-7, FOR THE PURPOSE OF TESTING THE RELATIVE VALUE OF CORN AND ROOTS.**

PEN AND DESCRIPTION OF SHEEP AND FEED.	Weight Dec. 1886.	Weight May 1887.	Gain in lbs.	Feed Consumed.	Value of Feed.	Feed consumed for each 100 lbs. of live weight.	Value of feed con- sumed for each 100 lbs. of live weight.	Gain for each 100 pounds of live weight.
No. 1. Two Grade Merino Wethers. Corn and Hay.	125.5	182.0	36.5	Hay, 326.13 lbs.	\$1 95	Hay, 251.53 lbs.	\$1 30	25.05 lbs.
				Corn, 248.81 "	4 44	Corn, 168.18 "	3 00	
					\$6 3		\$4 30	
No. 2. Two Grade Merino Wethers. Roots and Hay.	112.0	131.0	19.0	Hay, 262.75 lbs.	\$1 53	Hay, 214.04 lbs.	\$1 28	15.75 lbs.
				Roots, 1,281.81 "	3 42	Roots, 1,047.11 "	2 79	
					\$4 94		\$4 07	
No. 3. Two Grade South Down Wethers. Corn and Hay.	178.5	215.0	36.5	Hay, 268.08 lbs.	\$1 55	Hay, 138.92 lbs.	\$0 83	19.04 lbs.
				Corn, 362.76 "	6 43	Corn, 186.83 "	3 84	
					\$8 08		\$4 17	

No. 4. Two Grade South Down Wethers. Roots and Hay.	170.5	192.0	21.5	Hay, \$29.90 lbs. Roots, 1,861.75 "	\$1 96 4 96 \$6 94	Hay, 186.71 lbs. Roots, 1,065.04 "	\$1 16 2 84 \$4 00	12.43 lbs.
No. 5. Two Grade Cotswold Wethers. Corn and Hay.	158.0	225.5	67.5	Hay, 397.84 lbs. Corn, 369.25 "	\$2 30 6 50 \$8 80	Hay, 212.83 lbs. Corn, 186.43 "	\$1 23 3 33 \$4 61	34.84 lbs.
No. 6. Two Grade Cotswold Wethers. Roots and Hay.	161.5	216.0	64.5	Hay, 445.95 lbs. Roots, 1,861.75 "	\$2 08 4 96 \$7 04	Hay, 253.03 lbs. Roots, 1,023.39 "	\$1 52 2 73 \$4 25	30.43 lbs.

The sheep in Pens No. 5 and 6, at the close of the experiment, May 15th, were turned out to pasture until Nov. 2, when they weighed as follows: Pen No. 5, 229 lbs.; Pen No. 6, 244 lbs.; showing a gain during the summer on grass alone, of 3.5 lbs., of the sheep in No. 5, (corn-fed,) and a gain of 28.0 lbs. of the sheep in No. 6, during the summer.

Sheep No. 2, in Pen 5, was shorn May 24th, and the others were shorn June 8th. The weight of fleeces unwashed was as follows:

PEN No. 5.		PEN No. 6.	
Sheep No. 1,.....	10 lbs. 7½ oz.	Sheep No. 1,.....	8 lbs. 1 oz.
" " 2,.....	9 lbs. 8½ oz.	" " 2,.....	9 lbs. 2 oz.
Total,.....	20 lbs. 0 oz.	Total,.....	17 lbs. 3 oz.

The results at the close of the year in dollars and cents, would be about as follows, not taking into account the item of attendance:

TABLE No. 6.

NO. OF PEN.	Weight of sheep Nov. 2, 1867.	Gain during the Summer, 24½ weeks.	Cost of keeping during Summer at 3 cts. per week for each sheep.	Total gain from Dec. 15, 1866, to Nov. 2, 1867.	Total cost of feed.	Value of wool at 30 cts. per pound.	Cost of feed over value of wool.	Cost of increase of carcass per lb. after deducting the value of the wool.
No. 5,.....	239.0	3.5	\$1 47	71.0	\$10 45	\$6 00	\$4 45	6½ cts.
" 6,.....	244.0	28.0	1 47	82.5	9 11	5 16	3 95	4½ cts.

These sheep were returned to their respective pens Nov. 2, for feeding during the winter, in continuation of this experiment.

Eight half-blood Cotswold lambs are likewise being fed in Pens No. 1, 2, 3 and 4, where it is proposed to keep them until shearing, when they will be turned out to pasture and taken up again in the fall.

M. MILES.

COLLEGE FARM, Dec. 1st, 1867.

## EXPERIMENTS WITH FERTILIZERS.

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STATE AGRICULTURAL COLLEGE, }  
November 23, 1867. }

*To the Hon. Board of Agriculture:*

In compliance with the resolution of the Board, the Superintendent of Horticulture presents this report upon experiments.

No experiments were conducted during the past year, by authority of the Board or Faculty; the Department of Horticulture, however, attempted a number of experiments, the most important of which are as follows:

1st. To determine the relative economy of a number of special fertilizers, as compared with themselves and with ordinary stable manure. For this purpose a number of plots were laid off in the fruit garden, each of which was fertilized with one of the following manures:

- 1st. Privy compost.
- 2d. Stable manure.
- 3d. Peruvian Guano.
- 4th. Bruce's Concentrated manure.
- 5th. Bone Dust.
- 6th. Hoyt's Super-phosphate of Lime.
- 7th. Miller's " " " "

To each manured plot there was one on which no manure was applied, these serving as a basis of comparison between themselves and the manured plots. The whole was planted to corn, care being taken to have the same number of plants on each plot.



2d. The second experiment was conducted in the same manner as above, except beans were planted in place of corn.

3d. The third experiment was to determine the effect of fertilizers on soil destitute of vegetable mould, and uninfluenced by any previous fertilization. For this purpose a number of plots 4x4 were laid off, and the surface soil removed, until the barren and sandy sub-soil was reached, this surface soil being replaced by a perfectly barren soil, obtained three or four feet below the surface. As this sub-soil was all obtained from the same place, it gave the plots thus prepared, a perfectly uniform character. For the purpose of insuring greater accuracy a bottomless box, 2x2 feet, was placed in the centre of each prepared plot, and sunk even with the surface. This was to prevent the roots of the plants from extending so far as to obtain nourishment from beyond the proposed plots. Three boxes were then manured with the fertilizers above mentioned, some being left without manure, in order to serve as a basis of comparison. Five plants of corn were grown in each box.

From these experiments thus conducted, instructive and interesting results were anticipated; they were however, defeated, by an inroad from swine, just before their completion. The labor and care involved in conducting experiments of this kind, in manuring, weighing, recording, and in unremitting attention, is much greater than is generally supposed, and it is to be regretted that a whole season's labor is thus lost.

I have placed on exhibition in the President's office, specimens of most of the fertilizers employed in these experiments, with names and prices attached.

Respectfully submitted.

A. N. PRENTISS,

*Superintendent.*

## CHARACTERISTICS OF THE SEASON OF 1867.

Compared with the season of 1866, that of 1867 presents in some respects a wide contrast. The last spring was backward on account of coldness and wetness, and planting was delayed to a late period. With June the temperature became suddenly warm, and vegetation grew rapidly for a few weeks. From the beginning of July, the character of the weather, as to moisture, turned, and from that time to the end of the year, it continued on the extreme of dryness. A comparison of the rain-fall, in inches, from May to November, inclusive, of the years 1866 and 1867, as shown by the Meteorological Journal, kept at the State Agricultural College by Prof. Kedzie, is herewith presented:

MONTHS.	1866.	1867.
May,.....	3.478	3.809
June, .....	5.366	2.828
July,.....	4.194	1.782
August,.....	3.442	1.740
September,.....	5.806	1.419
October, .....	3.566	2.108
November, .....	2.600	2.180
	28.452	15.866

It will thus be seen that from the first of July to the last of November, five months, we had this year an aggregate of only 9.229 inches of rain, against 19.608 inches for the corresponding months of 1866—a difference of more than one-half.

The weather continued very dry till the ground froze up for the winter. The temperature of the autumnal months was, however, unusually mild, affording excellent facilities for securing, in good condition, the late crops of the season, as well as for making preparations for future agricultural operations. The ground was frozen but very little till the last of November; indeed there were but few days or nights when it was frozen at all. But at the close of November, winter suddenly set in, bringing the mercury down to zero at a single step, and effectually shutting up the ground in one night.

Many people had flattered themselves that winter would not set in while springs and streams were so low—lower, perhaps, than they ever were before at that season of the year, since the country was settled. Water for man and beast was scarce and hard to be got, and it was feared that actual suffering might ensue if the fountains were not soon replenished. But under this state of things the winter closed upon us. In many localities the people have already been put to much inconvenience to obtain water for stock, although most portions of this State have been less incommoded than many sections of Illinois and other more western States.

The extreme dryness of the autumn was unfavorable to wheat-sowing. Fallows which were broken in June, remained in such condition that they could be readily worked at seeding time, though in some cases they did not become rotten enough to admit of cross-ploughing. Sward ground generally became too hard to plough, after June, and the result was that more corn ground than usual was sown to wheat. Had an ordinary degree of moisture accompanied the mild temperature of October and November, wheat would probably have assumed a promising appearance by the setting in of winter; but the ground was too dry for the plants to tiller or spread, and their general appearance,—particularly in the south part of the State,—was not encouraging on the first of December. Soon after this the ground was covered with snow,—though not to a

great depth,—followed by a uniform temperature which may be regarded as favorable to the crop.

Cattle and sheep were generally much straightened for food during the autumn. Sheep, however, sustained themselves better than could have been expected, and in many instances came to the barns in better condition than they did in 1866—the unusual wetness of the latter season having been unfavorable to them.



## YIELD OF CROPS FOR 1867.

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In order to obtain, as far as practicable, trustworthy information in regard to the yield of crops for the year, the Secretary of the State Board of Agriculture issued a circular in November, a copy of which was sent to the president or secretary of each Agricultural Society in the State. Returns were, however, only received from sixteen counties, comprising eighteen societies.

**HAY.**—This important crop seems to have been unusually good. None of the returns received speak of its being less than an average yield, while most of them rate it above—from five to thirty-three per cent. It was generally secured in good order. Owing to the drought which set in before the crop was secured, there was but very little after-growth, and a light crop of clover seed.

**WHEAT.**—There can be no reasonable doubt that the yield of this grain the present year, taking the entire State, was less than an average. Of the returns received, only three counties,—Lenawee, St. Joseph and Washtenaw,—report an over-average. One,—Ottawa,—reports an average; while Allegan, Branch, Calhoun, Cass, Eaton, Hillsdale, Ionia, Kalamazoo, Kent, Lapeer, Livingston and Tuscola, report an under-average—ranging from twenty to fifty per cent., or in the aggregate, thirty-three per cent. under-average.

The causes of the deficiency are reported as having been the wheat-midge, the Hessian-fly and winter-killing. Of these, much the greatest damage is charged to the midge, and it seems

probable that the charge is correct. So far as related to the growth of straw, the crop appeared generally promising; indeed, at the time of harvesting, the belief was very generally entertained that the crop was a good if not a bountiful one, and the illusion was only dispelled when the grain was thrashed and measured. The extent to which the midge had lessened the yield was then realized.

It is well known that the wheat crop of this State has been seriously diminished from the ravages of this insect in previous years. It is also known that some varieties of wheat suffer more from its attacks than others. The variety called Soule's wheat, which has for several years been extensively cultivated here, is one that is very liable to injury from the attacks of the midge. Hence it becomes an important question for the consideration of our farmers, whether they will adhere to this variety. In the State of New York, where the Soule's wheat was formerly grown extensively, it has been found necessary to obtain varieties less susceptible to injury from the midge. It will probably be advisable for our farmers to adopt a similar course.

Of the varieties which have been substituted with advantage for the Soule's wheat, the Treadwell and the Diehl deserve mention. Both these kinds were grown in this State in a few instances the present year. It is represented that they were comparatively little injured by the midge, and generally yielded well. In regard to the relative merits of the two last named kinds, judging from the statements of those who have cultivated them, the Treadwell is more hardy, and is better adapted to ground not thoroughly prepared, while the Diehl is a somewhat whiter grain, and under favorable circumstances will yield as well as the former.

Wm. R. Schuyler, of Marshall, well known as an intelligent farmer, wrote, soon after harvest, that he had grown the Diehl wheat the past season; that "it was not at all injured by the Hessian fly; came earlier into ear than the Soule's, and was almost free from midge. It was sown on rather light soil, not highly

manured; stood rather light on the ground, but gave a plump, fine grain, and will no doubt yield well from the straw."

Mr. Schuyler states that he had received a letter from Mr. John Johnston, a well-known farmer and successful wheat-grower, of Geneva, N. Y., stating that his crop of wheat the present year consisted wholly of the Diehl variety; that it was sown after barley, and that the yield on one field that had been well manured, was nearly thirty-four bushels per acre—the grain plump and fine. The Wickes is another variety of wheat that seems to have succeeded well in New York, and is considered almost proof against the midge. Several instances have been reported in the State, where the Treadwell wheat yielded the present season from twenty-five to upwards of thirty bushels to the acre, being nearly exempt from injury by the midge, though the Soule's wheat growing in near proximity, was nearly ruined by that insect. The opinion has been expressed, and does not seem improbable, that had the Treadwell and Diehl varieties of wheat been sown instead of the Soule's, the result would have been millions of dollars to the advantage of our farmers.

**BARLEY**, in the few cases reported on, generally yielded an average or over. Only two counties,—Kalamazoo and Washtenaw,—reported an under-average.

**OATS** are generally reported at an average or over. The counties of Branch, Eaton, Hillsdale, Kalamazoo and St. Joseph, however, report an under-average equal to fifteen per cent.

**BUCKWHEAT**.—Cass, Kent, Lapeer and Tuscola counties report an average yield. The other counties heard from, report an under-average from twenty to fifty per cent.—the causes of deficiency being drought and frost.

**INDIAN CORN**.—Ionia and Lenawee counties report an average yield; Calhoun reports ten per cent. over an average, Lapeer twelve and a-half per cent. over, and Tuscola ten per cent. over. The other counties heard from, report the yield at from ten to



fifty per cent. under-average—equal in the aggregate, to twenty-five per cent. under-average.

The deficiency is attributed chiefly to drought. In a few instances, injury by frost is mentioned. The yield has generally been comparatively better in the more northerly counties, where the drought was much less severe. Thus Lapeer and Tuscola report the crop considerably above an average.

Another important point connected with this crop deserves notice. All soils of a tenacious character were thoroughly saturated with water last spring. Some corn-fields were nearly in this condition at planting time. The drought came on suddenly, and where care was not taken to keep the ground in a friable condition by proper cultivation, it packed too closely for the crop to flourish. Where the work was not done in the "nick o'time," it could scarcely be done at all. Weeds sprang up and smothered down the corn.

If there is any one thing more essential than any other to the success of the corn crop, it is *clean cultivation*. Even the past season, the cases have been very rare, where, if the right cultivation has been applied at the right time, and the ground kept free from weeds, that a fair yield has not been obtained.

POTATOES.—This crop was generally diminished seriously in yield from the effects of drought. The northern sections, being better supplied with rain, have produced fair yields. Thus, Tuscola county reports five per cent. over an average, and Lapeer an average. In the Grand Traverse country, too, the crop did well. The other sections of the State report a deficiency, ranging from ten to fifty per cent. under an average yield. It will be safe to put the deficiency in the central and southern parts of the State, as thirty-three per cent. below an average. The quality, however, is generally good, the tubers being free from rot or disease. In sections of the country east and west of this State, the crop seems to have been shorter than here—in the Eastern States, from excess of rain, and in the Western, from even more severe drought than prevailed here.

The result is a brisk demand for Michigan potatoes, and at prices remunerative, even with the small yield.

APPLES.—The counties of Allegan, Hillsdale, Kent, Lapeer and Lenawee, report an average yield; Tuscola reports ten per cent. over an average, and Washtenaw twenty-five per cent. over. The other counties heard from report an under-average of fifteen to fifty per cent. There has been a fair demand for winter apples; but owing to the heavy losses which some dealers in apples sustained in 1866, prices have not reached a very high figure—fifty to sixty cents per bushel being about the range paid to farmers by the quantity.

PEACHES have of late years been so uncertain in most parts of the State, except along the shore of Lake Michigan and Traverse Bay, that but little attention has generally been given to the trees. The crop is this year reported, in most cases, as somewhat above an average of what it has been for the past ten years.



## NEW CROPS.

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### SORGHUM AND ITS PRODUCTS.

The wetness and coldness of the spring, appears to have been quite as unfavorable to the sorghum crop as to any other. This and some other causes, have occasioned a lighter yield of the products of this crop, than has been obtained before for several years. The following article is from a gentleman who has given much attention to this subject:

The interest in this crop has been steadily on the increase, and new developments are being made each year. Every season is not alike favorable to the growth of Sorghum, and the past season must be set down as the most unfavorable we have had since the introduction of the plant into the State.

The spring was very cold and wet, deterring many from planting, especially those whose lands were heavy; and even on the light soils, at the time when the cane should have been planted, the ground was altogether unfit to receive the seed, and those who planted either entirely lost their seed, or got a very poor stand of cane. A dry summer followed a cold spring, and the consequence was, that most of the cane was harvested in an immature state, and the yield of syrup, was of course, very much diminished.

All this is, of course, rather disheartening to the cane-grower; but every enterprise has its reverses, and this little back-set in the sorghum enterprise, will by no means discourage the majority of those engaged in its culture and manufacture. Thorough men, who work for a definite purpose, will take into consideration the causes of this year's failure, and go on with

renewed energy, knowing that the same causes will not be likely to occur every year.

The yield in the State, this year, may safely be estimated at 400,000 gallons, or about half the yield of last year.

In regard to the manufacture of sorghum, the quality of syrup is yearly improving. This is readily seen from the samples exhibited at the annual meetings of our State Cane-Growers' Association. The interest that is shown in these meetings may be taken as an index to the increasing interest in the sorghum enterprise throughout the State.

A new and very important discovery has been brought before the public, during the past year, called Clough's Refining Process. It is a practical operation of refining cane-juice and syrup, which has been examined and highly commended by many of the most prominent chemists in the country.

The effect produced by this refining process is very remarkable. The gummy or glutinous substances contained in the solution, are suddenly and perfectly curdled or coagulated. As the coagulated matter contracts, it locks up the earthy impurities, and all together subside to the bottom in the form of a compact sediment, leaving the fluid perfectly clear and transparent. This clear solution upon being poured or drawn off and evaporated to the proper density, affords a bright, thoroughly refined syrup, entirely devoid of acid and the characteristic sorghum flavor, and with a taste and flavor closely resembling maple syrup. No matter how foul or impure the original syrup or juice may be, the foreign matters are entirely removed by this operation, leaving the solution clear and transparent. In operating upon crude syrup, it is first reduced to about the density of 15 deg. Beaume, with water, then refined, and subsequently evaporated to the proper density. With green juice, the operation of refining may be performed at an early stage, or at any density not much exceeding 15 deg. B.

The apparatus required in addition to the ordinary evaporator, is very simple and inexpensive, and the refining materials used in the operation cost but a trifle. The operation can be

performed by any person of ordinary intelligence, after a few hours instruction and practice.

It will be well for those engaged in the sorghum business to examine this refining process, further details of which can be obtained by applying to the Clough Refining Company, Cincinnati, Ohio.

JOHN RICHARD.

TECUMSEH, MICH.

#### HOPS.

Perhaps there has been no year previous to this, since hops were introduced into this State, when the crop was so near a total failure as was the last one. The remark will apply, also, to some other sections. In central New York, which for several years took the lead in hop-culture, the last crop was not better than in the southern part of Michigan. In a trip made by the writer in the latter part of September, through New York, Massachusetts, Vermont and Canada, it was found that the hop crop had proved tolerably good only in Vermont, Northern New York and Canada West. The few hops as yet planted in the Grand Traverse section of this State, turned out well. But Wisconsin seems to have been the favored land in regard to the yield of this crop, the present year. Of the 20,000,000 of pounds returned to the Department of Agriculture as the product of the country, no less than 7,000,000 are credited to Wisconsin.

The causes of failure in this State were the hop-louse and drought. In New York, the former is considered to have been the main cause. It will be seen by the following letter from a Michigan hop-grower, that he thinks drought had quite as much to do as the louse, with the failure here:

MANCHESTER, Mich., Dec., 1867.

To SANFORD HOWARD, *Sec'y of Mich. State Board of Agriculture*:

In complying with your request to furnish some remarks for your Report in regard to the hop crop of the present year, I will say it was almost a total failure. I had ten acres in bear-

ing, from which I gathered 1,370 lbs. of hops. They were not of the first quality but fair, considering the season—would readily bring fifty cents per pound.

I attribute the failure in my case more to the drought than to insects, although there were plenty of the latter. I never saw hops have a more promising look, than mine had up to the first of July; I never had them set more full on the vines than they did this year. But the drought was so severe that it seemed to stop their growth when they were just in blossom. Of course there were some exceptions. Some hills scattered promiscuously over the ground, seemed to flourish and make quite a good show for hops. On examination, I found that those hills were but very little affected with vermin, and that they had taken deeper root than others; hence they suffered less from drought. These hills continued to flourish through the season; the hops on them filled well, and were firm and of good quality; still, they had kept company with a *lousy set*, and were not entitled to be classed as first-class hops.

What still further convinced me that the drought was more the cause of the failure in the crop than the vermin, is this: we had, through the months of July and August, occasional light showers—hardly enough to call *rain*, though I found it had a wonderful effect on the hops. It seemed to revive them, and for a time they would assume their natural color and brightness. I noticed particularly the effect of a light shower that fell one evening about the middle of August. It only wet the earth to the depth of an inch. As I was looking over my hops the next morning, I found the rain had produced a wonderful effect on the vines; it seemed to have at once put new life into them.

At this time my hop plantation reminded me of a dense forest, with here and there an evergreen tree,—as a pine or hemlock,—towering above all the other trees. I found that those light showers, in the latter part of August,—though the quantity of rain seemed trifling,—had a very striking effect on the

hops. Vines that were seemingly past all recovery, revived and even put out new arms and set for hops.

During the months of July and August, I visited several hop fields in Southern Michigan, and invariably found those that had been least affected by drought, were also least affected with vermin. So far as I am able to judge of the yield of hops in Southern Michigan, the yield would not be more than one-eighth of an average crop. As to price, I think it will not fall below forty cents per pound on the average.

I find through this section a number of farmers who have just commenced the culture of hops, and who are very much disheartened as to the prospect of the business. I would say to all these, persevere in the enterprise you have undertaken. I see no good reason for abandoning the culture of hops because they have failed the past season, any more than that I should abandon the cultivation of any other crop under similar circumstances. We sometimes meet with failures in the crop of wheat, but it would be unwise to abandon its cultivation on that account.

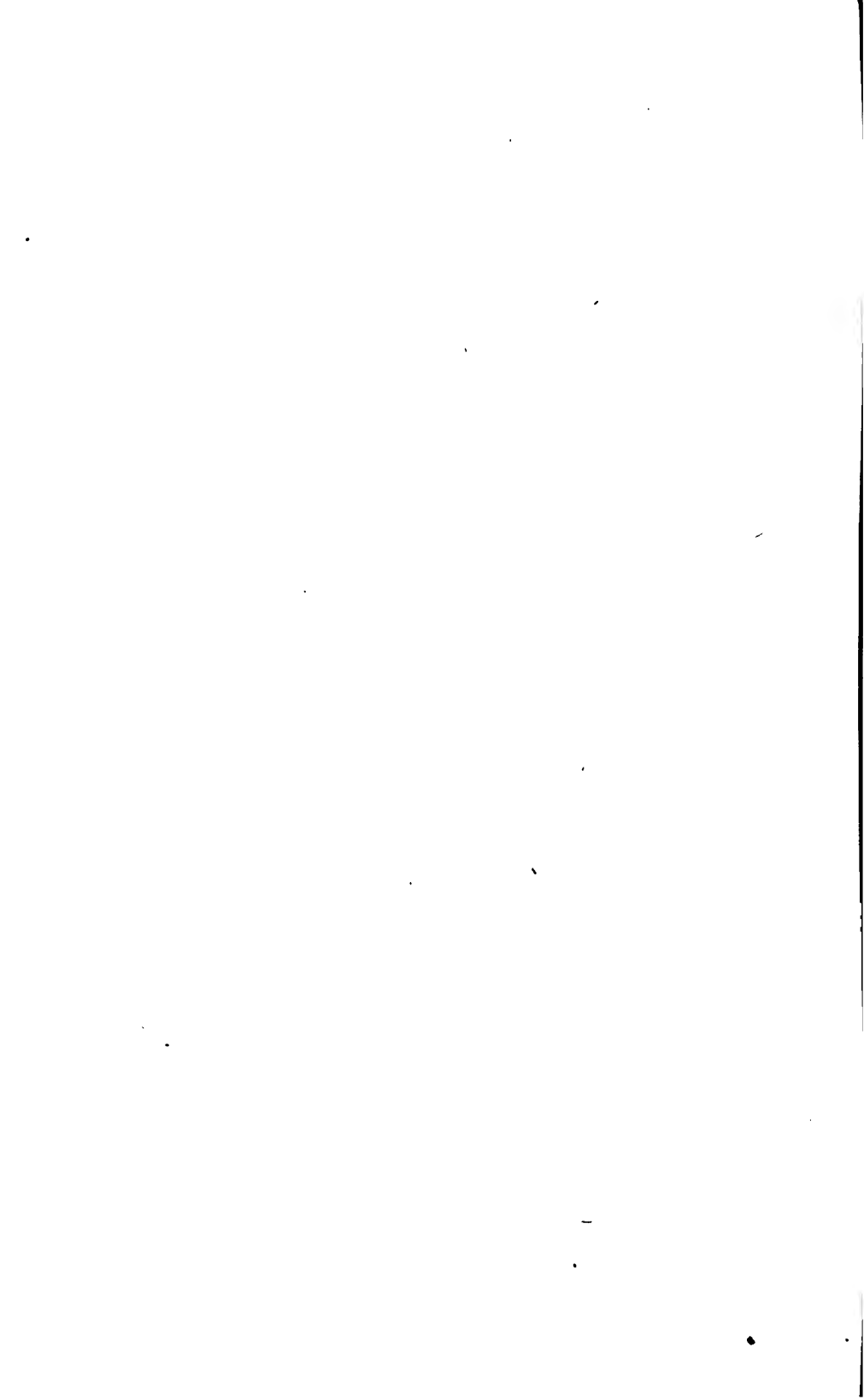
My faith is not at all shaken in regard to the profitable growing of hops in Michigan. I am preparing thirty thousand hop poles, in addition to what I have on hand, which will be sufficient to pole thirty-eight acres of hops. I purpose to have them all set the coming spring, and make the cultivation of hops a *specialty*, trusting to the All Wise Ruler of the universe for the result.

GEO. P. OATLEY.

#### PEPPERMINT.

In some parts of the State, more especially in St. Joseph county, peppermint has been grown extensively for the purpose of distillation. Wm. McCormick, Secretary of the St. Joseph County Agricultural Society, writes that the yield of the crop of the present year was about fifty per cent. less than an average, owing to the roots having been killed by the winter of 1865-66, thus leaving less growing mint on the ground. The aggregate product of oil for the county is estimated at 9,000 lbs.





## INJURIOUS INSECTS.

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### THE COLORADO OR SO-CALLED "NEW POTATO-BUG."

In preceding Reports, mention has been made of this insect, known to entomologists as the *Doryphora 10-lineata*, or Ten-Striped Spearman. Contrary to the usual migration of insects, this species is traveling from west to east. From its natural habitat near the eastern base of the Rocky Mountains, it has for a few years past been progressing eastward at the rate of fifty to sixty miles annually, devouring the potato and tomato plants which were found in its path. Kansas, portions of Missouri, Southern Iowa, Illinois and Wisconsin, have been successively invaded, and more or less overrun. Previous to the present year, it had not been heard of east of the two last-named States. From the isolated position of the main territory of Michigan, it being surrounded by water except on its southern border, hopes were entertained that the insect would not readily find its way here, or at least not until after it had become numerous in those portions of Indiana adjoining this State. But "the thing which we dreaded is come upon us." Before it was looked for, we were startled with the announcement that the Colorado potato-bug was in Michigan.

In the latter part of August, the Hon. Justus Gage, of Dowagiac, informed me that this insect had appeared on the growing potatoes in his neighborhood. He brought specimens to the Agricultural College, and placed them in charge of Mr. A. J. Cook. Of the precise time when Mr. Gage first saw the insect, or heard of its being in the State, I am not informed. Shortly after the specimens came into the possession of Mr. Cook, he

sent a communication to the *Western Rural*, from which the following extracts are taken:

"The insect belongs to the order Coleoptera, and therefore is a true beetle, and not a bug. It is four-fifths of an inch long; oval in form; cream-colored, with ten black lines running lengthwise along its back. Walsh, of the "Entomologist," thus describes the larvæ: 'Soft, elongated, six-legged grub; dull Venetian-red color, with several black spots; no wings. Some specimens of the larvæ which I obtained from Wisconsin have two rows of black spots on each side of the body, ten black dots in the upper and seven in the under row.' Hon. Justus Gage, of Dowagiac, tells me that this is true of specimens found in his garden, from which he raised the perfect beetle, which he has given to me.

"This insect very closely resembles another beetle, the *Doryphora juncta*, of Jermer, with which it is often confused, though they may be easily distinguished, as in the *juncta*, the second and third stripe, counting from the outside, are united behind, while in the *Spearman*, the third and fourth are thus united. The legs of the first have a black dot in the middle of each thigh, while this one has black feet and knees. The *juncta* feeds only on worthless plants, while the *10-lineata*, both in the larvæ and adult state, feeds upon potato vines, thus ruining entire crops, destroying thousands of dollars' worth of this vegetable in a single year.

"The Colorado bug is a native of Colorado, and lived upon a species of the solonacæ, or potato family, growing in that locality; hence was confined there till the potato was brought thither, which, suiting its taste better than its original food, it commenced its fearful ravages, moving eastward sixty miles a year, destroying the entire potato crop in its course. Enough of the beetles remained in each district to make the destruction continuous, while others roamed eastward, thus spreading and going on to spread, their devouring ravages. They cannot be forced to fly, only walking sluggishly away when disturbed; ye

they do fly from patch to patch, and their rose-colored wings are quite beautiful while expanded.

"Last year they were immediately west of Lake Michigan, but not south. How they have crossed over to Michigan is a mystery. They may have been carried over by the water, as beetles live a long time in the water; or they may have come over in some obscure part of a vessel's cargo, either in the egg, larvæ, or adult state. Mr. Gage informs me that they have commenced their work of destruction quite determinedly in Cass county. The female which I received from him has laid over twelve hundred eggs, thus giving us a frightful idea of their prolificness. Add to this the fact of several generations in a season, and the case seems indeed hopeless. It is probable that a million of dollars would not cover the damages done in our country by this insect in the year 1866, and still the prospects are that, unless preventive means are discovered, this destruction will continue even to the Atlantic. Michigan is already invaded, and the sad prospect for our future potato crop should cause us all to study and observe to the utmost, when, perchance, some of us may discover means to stay the ravages of this, to be, common enemy. Nothing has yet proved successful, though a farmer in Iowa writes that he put into his potato field a large flock of young turkeys, which ate the beetles, and thus saved his crop."

In a note received from Mr. Cook, dated Nov. 9th, he states that he has pretty good evidence that the eggs of the insect hatch within two weeks from the time they are laid, and that the larvæ feed about fifteen days; that the pupæ are in the ground, where they transform in about ten days; that the adult lives at least three weeks; and that there are doubtless four broods during the season. As showing the insect's tenacity of life, he mentions that he received from Wisconsin both the larvæ and the adult, which were a week or more on the way, shut in a close box without air or food. The beetles, after being fed, revived, and the females laid hundreds of eggs. The

larvæ, though alive on their arrival, were too far gone to take food, and in a few days all died.

Mr. Gage continued his observations on the insect in its different stages through the season. He sends the following extracts from his journal:

"Sept. 7th.—A few days ago, in order to ascertain the habits of the beetles on the approach of cold weather, I subjected them to the following experiment: I placed them in a glass tumbler two-thirds full of earth, and sat it in the coldest place I could find. The beetles all burrowed in the earth, where they remained five days. I then set the tumbler in the warm sunlight; all the beetles soon re-appeared and commenced feeding. I divested one of them of its wing-covers and unfolded its wings; they are of a reddish color, and nearly transparent. I see no reason why these beetles cannot fly.

"Mr. Jackson True reported to-day, that he had made a faithful trial with beetles I had given him,—about half a pint,—to see whether turkeys and ducks will eat them. He threw them before the turkeys, one of the younger of which, he thinks, hastily swallowed a beetle, but gave a cry of alarm, when after a short examination the whole flock went away, leaving the beetles. The ducks were, if possible, more wary than the turkeys. He mingled other food with the beetles; the ducks ate the food but left the beetles.

"Mr. David Haines, a farmer some five miles south of Dowagiac, reported that this insect was found in his potato-field for the first time, this season. He says his fowls (common barn-yard fowls and turkeys) had free access to the field, but did not eat the beetles or larvæ.

"A farmer and gardener at Michigan City, Indiana, informed me (Sept. 13th,) that this insect had made its appearance there for the first time, the past summer. I have also been informed that it is doing some damage near Lake Station, some twenty-five miles further west, on the Michigan Central railroad. But I have not been able to ascertain its appearance in any locality

in Michigan, with the exception of Dowagiac and its immediate vicinity.

"A potato merchant from Galesburg, Illinois, informed me that these beetles performed their migrations in the spring of the year, when they first emerge from the ground. He states that he had dug up many of them when at work on the railroad track in the spring; that they are then quite active, and that he had frequently seen them on the wing at that time.

"*September 19th.*—Mr. Josiah Russell, of Geneseo, near Rock Island, Ill., informs me that he had seen large numbers of these beetles last spring, emigrating from a field where potatoes grew last year and were nearly destroyed by this insect, to another field, about sixty rods distant, planted to potatoes this season, and in which the young plants had attained a growth of six or eight inches. The wind was from the west, and the insects were flying against the wind. He thinks they had been attracted by the odor arising from the plants, the same as bees are attracted by flowers.

"It would seem from this that the beetles migrate in the spring; that they can fly, and do thus pass from one locality to another. But if they fly at no other time of the year, a field of potatoes might be saved from *attack* by being planted at a later time, or from *destruction* by carefully destroying the beetles that make their first lodgment, and before they commence breeding.

"*September 20th.*—Mr. James Bernard, an old resident of the last mentioned locality, said he had learned how to manage the 'potato-bugs.' I had observed that in one patch of potatoes several rows were nearly stripped of their leaves, while the other rows in the same patch were nearly untouched. He said these potatoes were of different varieties; that the insects had a choice of varieties; that they would devour one variety before they would commence on some others growing along side. His plan is to plant first, such variety as the insects like best. The beetles would be attracted to them on coming from their winter's sleep, in the spring. Then plant his other varie-

ties. The beetles, he says, will not leave their first location so long as there is anything left for them to eat. His later planted kinds would be out of the way before they would be molested. What I saw on his grounds convinced me that there is truth worth observing in these statements. One patch which he showed me was completely stripped—the foliage and stalks literally devoured—whilst those planted later were uninjured.

“My opinion is, that any variety planted quite early, will answer equally well. The beetles, when once located, do not incline to remove far—either from sluggishness or affection for their young. As soon as the young are hatched they commence feeding with the parent beetles, which seem to watch over them during their larval growth. They continue to increase and multiply, and devour, until not a green leaf or stalk remains, even following the stalks down to the tubers, and eating holes into *them*; and yet another patch, not thirty rods distant, will remain untouched.”

When we consider the destructive powers of this insect, as shown by the ravages it has made in the districts it has overrun, its advent into Michigan may well produce anxiety. The potato is one of our most profitable crops, and both for home consumption and for exportation, stands in an important position. It is more largely cultivated in this State than in either of the States where the enemy alluded to, has previous to this year, made its appearance, and consequently, we shall be the greater sufferers if the insect prevails here in proportion to the means it finds for support. It is much to be regretted that we cannot, as yet, point to some certain and economical means of destroying the enemy, or warding off its attacks. The statement alluded to by Mr. Cook, that poultry would eat the beetles, seems to be disproved by the trials mentioned by Mr. Gage. The other plans spoken of by him, seem worthy of notice. It behooves every potato-grower to look earnestly for some effectual protection against this formidable enemy.

## THE CANKER WORM.

We have not heard of the appearance of this insect in any new locality during the present year. Neither does it appear that any special means have been taken to destroy or check it where it has appeared for several years. The colony in the neighborhood of Marshall is still flourishing and gradually spreading. It was mentioned in the report of last year that some of the trees first attacked were dead, and that others were evidently dying. I am informed that the indications of decay and death are much extended the present year, and that the speedy and total destruction of the orchards which have harbored this insect is now obvious. It would have been better if the suggestion of cutting down the trees and burning them had been adopted. It was evident three years ago, that the profits of the trees were ended. The insect could have been annihilated then with less expense than it can be now. But even at this late day, the best thing that can be done is to apply the axe and the torch. This would be an effectual, and considering the importance of the case, not expensive remedy.

In regard to means for preventing the female insect from ascending the tree, nothing can be added to what has been said in previous reports.





## THE GRAND TRAVERSE COUNTRY.

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That section of Michigan commonly known as the Grand Traverse country, has within a few years attracted much attention, both for actual settlement and for land speculation. Upwards of 100,000 acres of the Michigan State Agricultural College lands, have been located in the Grand Traverse district. With the view mainly of ascertaining something of the agricultural resources and capabilities of this region, the Secretary of the State Board of Agriculture, in the month of June last, visited some portions of it, and in this article presents a summary of his observations:

### TRAVERSE CITY AND ITS SURROUNDINGS.

Proceeding by water from Chicago, the point of destination was Traverse City, at the head of the west branch of Traverse Bay. This new town contains, perhaps, seven or eight hundred people. Considerable building was going on, and the population was receiving daily accessions. The site of the embryo city is a sand-beach, through which the Boardman river has cut its channel, making a curve first to the west and then to the east, comprising a tract of considerable extent, and leaving on the opposite side, between the river and bay, a narrow point on which the mills, stores, &c., of Hannah, Lay & Co., are situated, as well as various dwellings, belonging to the older part of the town. The logs which are sawed here, are brought down the stream above mentioned. The soil,—if soil it may be called,—where the town stands, gives dry building-lots, and though apparently nearly destitute of the elements of fertility, might probably be made to produce fruits and vegetables by manuring

and frequent and copious watering. This sandy tract extends to the east and north three or four miles; in other directions, but a short distance—a mile or so. The timber on the sand was chiefly pine—white and Norway or yellow—with some hemlock. Where the original growth has been cut off, poplars spring up thickly, and in some instances oaks appear.

#### THE TABLE-LANDS.

On leaving the sandy plain, there is a considerable ascent to what is called the table-land of the interior, portions of which are 400 to 500 feet above the lake and bay. It is a drift formation, in some places containing numerous boulders of various species of rock, mingled with gravel, sand, and occasionally clay mixed with the sand, in a sufficient degree to form what may be called loam—sometimes clayey loam—but rarely clay of such purity and tenacity as is required for bricks. Numerous limestone pebbles are found in the gravel, and in some instances larger fragments of limestone are met with in such quantities, that they are collected and burned into caustic lime. This is more particularly the case along the shores of the bay and lake. The general surface of the country near the bay and between the bay and lake, is quite undulating, and the soil and subsoil mostly rather porous, which gives sufficient natural drainage, except in a few localities. Small streams are quite numerous, and the water of nearly all is so clear and cold, that the traveler would ask for no better to quench his thirst. The speckled trout find a congenial home in many of these crystal brooks.

#### PURITY OF THE AIR AND WATER.

The numerous small lakes in this region are remarkable for the transparency of their waters, and even the water of the bay and Lake Michigan is of similar character. At Traverse City and at Northport, the bottom of the bay at the depth of sixteen to eighteen feet, can be seen from docks or piers. The fish taken in all these waters are of excellent quality.

It may not be improper to remark, in passing, that the air seems to be of equal purity with the water, which may not only account for the unsurpassed healthfulness of the region, but perhaps has some connection with the beautiful phenomenon of mirage, which is frequently seen here. We had the opportunity of seeing this without having been previously informed that it is one of the curiosities of the locality. Passing along the street at the head of the bay, an island, several miles distant, was seen reflected in the sky, in an inverted position. The trees of the island and those of its serial counterpart seemed to touch each others' tops at one point, while at others they were so separated as to form vistas through which the eye could discern the land and water beyond. The phenomenon was not entirely stationary; sometimes the inverted trees would descend so low that no light could be seen under them, and at other times they would rise so high that the outline and main features of the island could be distinctly traced. We were informed that much more remarkable specimens of this phenomenon were occasionally visible here—such as the reflection of inland lakes, with their surrounding shores clearly defined.

#### THE CLIMATE OF THE SECTION.

The productions of any country are, obviously greatly dependent on climate. The climate of the Grand Traverse region is quite different from what might be inferred from its position in respect to latitude. Accurate records which have been kept for eight years at Traverse City and nearly as long at Northport, show that the mean temperature of the winter months is several degrees higher than that of Ann Arbor, although the former are from about two and a-half to three degrees further north. This fact at the first view appears singular, but is doubtless to be accounted for by the influence of Lake Michigan, which, though less in degree, is similar in character to that produced by the Gulf Stream on the British Islands and the coast of Northern Europe. The water of the lake imparts heat to the air which comes in contact with it, and the prevail-

ing westerly and north-westerly winds convey the heat to the eastern shore.

All residents of the Grand Traverse region agree in stating that frosts very rarely occur there till late in the fall. In close proximity to the lake and bay, vegetation is frequently untouched till November, and the frosts are even then generally very light. The ground is never frozen but slightly, and in many winters scarcely at all. When the atmosphere becomes too cool for rain, snow falls and covers the unfrozen earth like a blanket—accumulating to such a depth that the most severe cold of the winter cannot penetrate through it, and thus preserving in the ground plants which in more southern latitudes would perish. It should not be inferred, however, that snow falls to so great a depth as to obstruct travel and the usual business of the season. In the beginning of winter it falls rapidly for a while, the vapor from the lake descending in that form; but it is said to seldom exceed the depth of two to two and a-half feet till about the first of March, when it sometimes accumulates to the depth of three to three and a-half feet. Of course this great quantity cannot remain long on the ground, and whether it goes off by the sun or by rain, it never produces freshets; the ground being free from frost and generally of a porous texture, the water is mostly absorbed. It is stated that the water flowing over the dam at Elk Rapids never varies in depth over four inches.

#### EXEMPTION FROM SPRING AND AUTUMN FROSTS.

The exemption of this section from autumnal frosts is, as may be supposed, one of its most striking features, and adds greatly to its value in reference to agricultural and horticultural products. Corn of the flint varieties, is considered sure to ripen if planted any time before the tenth of June; and varieties of grapes, as the Catawba and Isabella, which are very uncertain in regard to ripening in the open air, in the central and southern portions of the State, have for several years in succession ripened perfectly as far north as forty-five degrees.

The instances alluded to will be particularly mentioned in another place.

But it is not merely in the fall that vegetation is here exempt from injury by frost; it is seldom injured in spring. The snow holds everything in check till warm weather comes in earnest, and then the development is rapid. Fruit-germs, even of tender species, are seldom injured in winter. The greatest degree of cold registered at Traverse City or Northport, is 15 degrees below zero, and that but few times within the past eight years. On the peninsula which divides the two branches of Traverse Bay, it has not been so cold. At Old Mission, the lowest point marked within the past four years, is nine degrees below zero, and that only once and for a short time. With this exception, seven degrees below zero is the lowest the mercury has fallen.

#### SUCCESS OF PEACHES AND OTHER FRUITS.

The result is that peach buds are seldom injured by the cold, and the peach crop is considered as certain here as at any point on the eastern shore of Lake Michigan. Nearly all the peach trees seen by the writer, in his late excursion through the region, which were old enough to bear, were fairly set to fruit. Starting later in the spring, they are of course later in ripening; but persons who have been acquainted with peaches grown at St. Joseph and various other parts of the country, stated that they had never seen finer specimens of this fruit than are produced in the Grand Traverse region.

More time is required for apple trees to reach a bearing condition; but there are examples enough to prove that the trees will grow well and produce well. The oldest trees are those planted at the French missionary stations. The Indians obtained seed or young trees from the missionaries, and in some instances they have attained a large size, and have borne fruit for many years. None of these French or Indian trees appear to have been budded or grafted, though some of them produce good fruit. The oldest trees are still healthy and productive. Those planted by Indians have grown altogether in a natural way, and were never pruned.

On the farm belonging to the late New Mission Seminary,—the Institution is now abandoned,—there is a large orchard which has been planted fourteen years, and has for several years, previous to the last, produced good crops. The trees are very large of their age, although they have never been manured. All persons who have seen apples grown here, unite in saying that they have never known them surpassed in size or flavor. The crop failed last year; but this year there is a prospect of a good yield.

Young apple orchards, from those of this spring's planting to those of four or five year's old, are numerous, and many of them of very fine appearance. Mr. Perry Hannah, of Traverse City, has one of several years' growth, comprising forty acres, which is very promising. It is on the first slope of the highland that rises from the sand-plain, on which the town stands.

Pear trees have not as yet been planted to much extent. On the grounds of Rev. George N. Smith, at Northport, there are several very fine trees of different varieties, in a bearing state, the young fruit being handsomely set on the 18th of June. These trees have produced fruit for several years, the quality said to be very fine. There are also several fine trees, in bearing condition, on the grounds of Rev. Mr. Dougherty, at New Mission, and on the Seminary grounds before mentioned. In the garden of Rev. Dr. Walker, of Benzonia, are some as fine pear trees as can be found of their age in any part of the country. They comprise several choice varieties; have borne for several years, and the fruit has been pronounced of the finest quality by persons competent to judge. On the grounds of John Canfield, Esq., of Manistee, there are numerous pear trees, both dwarfs and standards, of from two to six years' growth from planting, many of which are models of beauty.

On the whole there is good reason to believe that apples, peaches and grapes will generally do well here, and that their cultivation may be made remunerative. Pears will probably succeed in some localities, which will be more particularly designated as we proceed.

In regard to apples, no reason can be seen why the trees should not be as productive and as long lived in this section as in any part of the country, or in the world. That the fruit will ripen perfectly there seems to be no doubt. From causes already stated, they will ripen later in the season; but this will give them advantages in reference to late keeping, and will enhance their value for the spring market. It is well known that winter varieties of apples at the north are in some cases autumn varieties at the south, and will keep there but a short time. For this reason apples produced in Maine will sell higher in New Orleans, in spring, than those grown in Ohio. The further north apples can be grown, or the later they are in ripening, provided they do fully ripen, the later they will keep in the spring and the better will be their quality. We are informed that apples taken from the vicinity of Northport to Chicago, in spring, have been pronounced superior in quality to any others of the same kinds in that market.

In regard to grapes, the oldest vines in this section appear to be perfectly healthy. The calcareous matter in which much of the soil abounds, seems to render it well suited to the grape. Judge Fowler, on the peninsula, twelve miles below Traverse City, has vines of the Isabella grape which have not failed to produce large crops of perfectly-ripened fruit for the past eight years. His son, living two miles further down the peninsula, has vines of the same variety, which in a more exposed situation, and with less attention to pruning, have produced well-ripened fruit for several years in succession. On the grounds of Mr. Marshall, near Old Mission, there are fine vines of the Catawba, Isabella, Concord, Delaware, Iona, &c. Mr. John Drew, formerly of Detroit (father-in-law of Mr. Marshall), states that the Catawba has not failed to ripen perfectly for the past four years; that he has compared the fruit with the same variety produced at Kelley's Island and points on the shore of Lake Erie, and that no difference can be perceived in the quality.

At Old Mission, Mr. Parmelee, formerly engaged extensively



in fruit-culture at St. Joseph, has lately bought a tract of land to be devoted, principally, as stated, to peach and grape culture. Other persons from the place mentioned, and other sections, have lately bought land here to be devoted to similar purposes. It is reasonable to suppose that a person of the experience of Mr. Parmelee, would not be very likely to make a mistake in the selection of a locality for the business he designs to pursue.

Another man who has lately bought land here, proposes to establish a cranberry plantation. At the distance of a mile or so from the shore of the bay, there is a small lake, from which there is considerable fall towards the bay. It is proposed to plant the cranberry vines between the lake and bay, and water them to any extent that may be needed, from the lake.

At Northport and New Mission, Rev. Geo. N. Smith and Rev. Mr. Dougherty have fully demonstrated the practicability of ripening, perfectly, any varieties of grapes that are grown in the south part of the State. Indeed, so well established is the fact that good grapes can readily be grown here, that many persons are setting out vines, and in every instance that came under the writer's observation, vines of proper age which had received suitable care had put forth an abundance of blossoms or young fruit for the present year.

Plums have done well in many instances in this section. Thus far the fruit has neither been attacked by the curculio, nor the trees by that insidious and destructive fungus, the "black wart," from which this species of tree has of late years suffered so greatly at the East. The plum, however, like the pear, generally succeeds best in soils which contain considerable clay, or especially, where the subsoil contains considerable of this element; and if the curculio should reach this section, as it probably will, sometime, the looseness which is a common characteristic of the soil here, will favor its propagation.

It is well known that pear trees thrive best when the roots extend into a soil of at least as much tenacity as would be called a clayey loam. A distinguished cultivator of pears in the State of New York, and the author of one of our most valuable

treatises on fruit-culture, on being asked what kind of soil he preferred for pears, replied: "A soil so tenacious as to require underdraining." Experience and observation prove that with such a soil and proper cultivation, pears flourish well. There are tracts of land of considerable tenacity in this section of the country, on which this fruit will doubtless succeed. It is not intended to say that pears cannot be produced on lighter soil, but simply that soils of a somewhat tenacious character are best adapted to them.

The Secretary deems it proper to add, in this connection, that he received in November, from Rev. Geo. N. Smith, of Northport, very fine specimens of the Beurre Diel pear, grown in his garden. They were of large size and excellent flavor. Mr. S. also sent handsome specimens of several kinds of apples grown on his grounds, including Rhode Island Greening, Belle Flower, Westfield Seeknofurther, Newtown Pippin, Peck's Pleasant, &c. All the specimens were well grown, fair, and in every respect perfect of their kind. Mr. S. also sent specimens of the *dent* and several varieties of *flint* Indian corn—all well ripened, though the seed was planted on the second day of June. It was stated that the first frost to injure vegetation in the vicinity of Northport the present autumn, was on the 22d of October.

No reason appears why cherries may not succeed over nearly the whole of the Grand Traverse region. The comparative mildness and uniform temperature of the winter, together with the generally porous nature of the soil, may be regarded as favorable to the finer kinds of this fruit, or the so-called "heart" cherries. Several trees of these varieties on the grounds of Rev. Mr. Smith, of Northport, were handsomely set to fruit, and the trees appeared healthy and thrifty.

The smaller fruits can undoubtedly be grown here in abundance. Strawberries, however, requiring, as they do, much moisture, should be planted on grounds selected with a view to a supply of this element. In many instances there would be no difficulty in applying water by irrigation.

## CAPABILITIES OF THE COUNTRY FOR GENERAL AGRICULTURE.

Having spoken of this section in reference to the production of fruits, it is proper to notice its capabilities for other crops.

Winter wheat is at present considered the leading staple here. We had no means of ascertaining the average yield; and indeed if an average could now be obtained it would not present a fair view of the character of the soil and climate in reference to the production of this crop. A large portion of the wheat produced here is grown on land just cleared from the forest—the seed sown on a “burn,” frequently without ploughing, and the work, in many cases only imperfectly performed. So that the result would indicate nothing in regard to what would follow proper cultivation. Although a large portion of the soil is considered good for wheat, there is one very general objection to its physical condition—it is too loose. There are, to be sure, tracts of greater or less extent to which this objection is not applicable. It is an English maxim, supported by experience and observation the world over, that wheat, in the long run, succeeds best where it has a pretty firm soil for its lower roots. It is true that in some districts of England, as in Norfolk, land which was formerly too light for wheat, has been, by a process of consolidation, made to produce very satisfactory crops of that grain. The required density of the soil has been produced by the tread of animals (particularly sheep) in feeding off the crops—clover, grass and turnips—in connection with the use of the roller.

A similar process is necessary to bring much of the land of the Grand Traverse region into a condition for producing the best crops of wheat and grass. The openness of the soil is favorable to the wintering of the wheat plants; “freezing out” is rare, and we saw but few instances where the plants had been *smothered* by the accumulation of snow. As has been already remarked, there is generally a sufficiency of lime in the soil for any crop. Indeed, the sap of the sugar maple contains so much lime as to seriously interfere with the production of good sugar, except where the means of separating it are un-

derstood and observed. The fact of lime being present in the sap of the maple has long been known in other sections—as Maine and Massachusetts—but the quantity is particularly large in the Grand Traverse country.

We have already said that there are tracts of land through this section, to which the objection of too great porosity will not apply. The Monroe Settlement, so called, fourteen miles south of Traverse City, may be referred to as one of these. The soil of this tract is of excellent composition, and its physical texture apparently almost perfect for many products. Six years ago, four brothers Monroe came here from Steuben county, N. Y., and marked out for themselves farms in the unbroken wilderness. Great judgment was evinced in the selection of the land, which enabled them to start on a good foundation. The same good judgment has evidently directed all their operations to the present time; and the result is they have made an opening, the view of which will well compensate one who can appreciate it, for a long journey. Passing along a good road, of liberal width, the borders kept perfectly clean from bushes and weeds, extensive well-fenced fields are seen on either hand, teeming with luxuriant crops of all kinds adapted to the climate. With due attention to economy and ultimate profit as well as comfort, capacious and well-finished barns have already been erected, and in some instances the log houses have given place to tasteful and convenient dwellings.

Mr. Henry Monroe states that the average of his wheat crops has been 26 bushels per acre—the minimum 18 and the maximum 42. The smallest yield was in 1864, so remarkable for drought. His crop this year was very promising on the 20th of June. An exception to this remark should, however, be made in reference to a field of spring wheat, in which the writer found the Hessian-fly—*Cecidomyia destructor*—in considerable numbers, though informed by Mr. Monroe and others that the insect had not previously been seen in this region. Mr. M.'s Indian corn crops have averaged 30 bushels to the acre; his potatoes 300 to 400 bushels per acre. He has not raised many oats; but on

the adjoining farm of William Monroe, oats yield 50 bushels per acre. Henry Monroe's farm consists of 240 acres, 80 of which are cleared, and 20 more "chopped."

Various other tracts were seen where the soil was sufficiently tenacious for any crop, and on which, as on the farms of Messrs. Monroe, there were fine crops of grass. A few tracts were passed through, where the soil was so tenacious that underdraining will be required to bring it to a proper state of friability, but which with this improvement will unquestionably be very productive in grass, and good for many other crops.

#### THE SCARCITY OF CLOVER—ITS CAUSE AND THE REMEDY.

The scarcity of clover is one of the first things noticed by a stranger on the farms of the Grand Traverse region. On inquiry being made as to the cause, it appeared that comparatively few attempts had been made to produce clover. In most cases where an attempt had been made, the seed was sown in the spring on wheat which had been sown the previous fall. According to the numerous statements, this is generally a very unfavorable time for sowing clover in this section. Immediately after the snow disappears, the top of the ground, owing to its porosity, becomes too dry for clover-seed to germinate, and the few plants which appear cannot strike root sufficiently to sustain themselves against the dry weather which occurs before the wheat is taken off the ground.

It seems to be a very general opinion that clover succeeds better when sown in the fall; indeed, various persons state that it succeeds well when sown at that season. The weather is said to be usually quite moist for sometime before the setting in of winter, and that if clover-seed is sown either by itself or with wheat at the usual time of seeding, the young plants will go through the winter well, and sustain themselves through any ordinary drought the following season. That it is practicable to produce good crops of clover here, has been demonstrated.

The scarcity of clover and grass seems to be owing partly to an idea that it is of but little use to try to produce these crops,

and partly to the labors of many of the settlers being almost wholly directed to the production of articles required for the immediate support of their families. In summer, cattle are generally left to obtain their living wholly from the forest range, and the scanty supply of food laid up for the winter in many cases obliges them in that season to live or die by browsing on the maple, bass-wood, and other trees, or in some cases on the ground-hemlock, which is abundant, and being evergreen, is readily eaten. It is thought, however, that where animals feed largely on the last named shrub, it frequently produces injury, and sometimes death.

From certain defects of much of the soil here and certain characteristics of the climate, which have already been noticed, clover and grass are not as readily grown as in some other sections. Still, so far as can be judged from the soil itself, there is but very little of the Grand Traverse country that is not as well adapted to grass as most of the sandy lands of the south part of the State. There are tracts, too, in Grand Traverse which are very natural to grass; and there are farms on which large crops of hay have been annually cut for several years, affording to the owners a larger profit than could have been obtained from any other crop. The large number of teams engaged in lumbering, make a great demand for hay, at an average price at the barn, of at least twenty dollars a ton. The few farmers who have selected the right kind of land, have done well by the production of hay.

In regard to clover, the main difficulty appears to be in carrying the plant through its earlier stages. Where this has been effected heavy crops have been obtained. Mr. Hannah, of Traverse City, had a crop a few years since on his forty-acre orchard lot, before mentioned, which was allowed by many persons who saw it, to be equal to any they had seen elsewhere. Indeed, it has been demonstrated that even the land in this section which has been longest under cultivation will with the right treatment, produce clover abundantly.

The farm of Mr. Marshall, near Old Mission, consisting of

240 acres, may properly be called an old farm. Mr. M. purchased it about four years ago of Mr. Ladd, who had occupied it about twelve years. Previous to its purchase by Mr. L., much of it lay in what was called "old Indian gardens." Such cropping—cultivation, it can hardly be called—as is practiced by the Indians had been carried on here for an unknown length of time. No fertilizing material was ever applied. Indian corn and a few vegetables, with here and there an apple tree, were all it was attempted to produce; but the ground became overrun with every weed that would grow. Since Mr. Marshall purchased the farm, he has made the keeping of stock a prominent object, and of course has attempted the production of clover and grass. Last year he obtained from a field of twenty acres of what had been the *hardest run* part of the farm, fully two tons of clover hay to the acre. The same field had on it the 22d of June, last, a growth of clover and timothy which bid fair to yield more than two tons of hay to the acre. Mr. M. had added nothing to this land in the way of manure, except fifty pounds of gypsum to the acre last year, and the same quantity the present year. Another field of twenty acres was seeded to clover and grass last year, and this year is pastured with sheep. The ground was well covered with herbage, and the sheep were in high condition. The lot, like the first-mentioned one, had merely been plastered. Mr. Marshall's wheat the present year, upwards of twenty acres, is stated to have yielded twenty-four bushels to the acre. Larger yields were obtained in some instances, and the average for the whole section, is thought to have been twenty bushels per acre.

We noticed on this and other farms in the same neighborhood, that even the lightest lands where grazed for several years, had become firmly swarded with blue-grass—*Poa pratensis*—with an occasional mixture of white clover—*Trifolium repens*. This will have an excellent effect in solidifying the soil. In a few instances farmers were breaking up this sward, and it was noticed that the furrow-slices were sufficiently compact and unbroken.

Much of the soil of this region which is now too light, if it could be once well swarded, would be greatly improved by the compactness thus imparted. Hence the production of forage crops should be earnestly attempted, both on account of the profit they afford in themselves, and the improvement they would confer on the soil in reference to the growth of other crops. Clover should be the first object. It may be advisable to try the northern or pea-vine variety. It is a hardy, strong-growing plant, and as its roots run deeper than those of the smaller kinds, it may better sustain itself in dry soils. The use of plaster in connection with clover, as well as other crops, will probably be found very beneficial. In the few instances where it has been used, so far as could be learned, it has resulted in a great increase of the crop.

#### BEST GRASSES FOR THIS SECTION.

What grasses will succeed best here must be determined by trial. So far, little attention seems to have been given to anything but timothy—*Phleum pratense*. But this is not a very hardy species, nor, except in very favorable localities, very long lived, although generally considered perennial. Much of that which we saw in the Grand Traverse country stood thin on the ground, and appeared stunted—headed out very low and with very short heads. This remark is more particularly applicable to timothy which grew by itself; where it was seen mixed with clover, it in some cases shot up well and made a good growth. But it is not well adapted to very dry land. Red-top—*Agrostis vulgaris*—and orchard-grass—*Dactylis glomerata*—will do better on dry soils. On the farm of Mr. Steele, in Homestead, Benzie county, we saw a small patch of orchard-grass which was very luxuriant. It will be well to make further trials of this species here. It is generally considered better adapted to pasture than hay, although it makes good hay if cut when in blossom. Blue-grass and flat-stemmed wire-grass—*Poa compressa*—will come in without being sown, as the country gets older and grazing is



more practiced. They are very nutritious grasses, and make good pasture on deep calcareous loams. They make the best of hay, also, but the yield is not generally large, if cut at the time of blossoming. The blades of blue-grass continue to grow through the whole season, if there is sufficient moisture, and the stalks of wire-grass remain green through the season, sometimes through the following winter, and are always readily eaten by stock.

#### THE PRODUCTION OF INDIAN CORN.

As having an important connection with forage crops, it is proper to make more particular mention than has hitherto been made, of Indian corn. An expression of a late distinguished American agriculturist, that this plant is "meal, meadow and manure," has almost passed into an adage. Of course the expression is more especially applicable to sections where Indian corn flourishes or is very easily produced, than elsewhere. It is not contended that this crop can be grown as cheaply in the Grand Traverse region as on the prairies of Illinois and Iowa, or that the average yield will be as great; but with proper attention to the selection of varieties, it is believed that the crop will be as certain to mature, and that it may be made remunerative so far as wanted for home consumption. Thirty bushels to the acre have in many cases been produced, without manure, and with ordinary cultivation; while 50 and even 60 bushels to the acre have sometimes been obtained. The grain is almost always heavy and of good quality. It is used largely as human food, and is the best material the country affords for making pork. The value of the fodder for the winter feeding of stock, is probably fully equal to that of a good crop of hay grown on the same extent of ground—thus showing how corn serves for "meadow," as well as "meal."

What are called the *flint* varieties are generally cultivated here; but the southern *dent* has been grown in various instances, and ripened perfectly. This has been the case on the farm of Mr.

Marshall, near Old Mission; also at New Mission, and in other localities. A large portion of the soil is well adapted to Indian corn, and the rapidity of its growth during the time the writer was in this section, was a matter of surprise.

#### ADAPTATION OF THE SOIL TO POTATOES.

Potatoes are grown here with less expense than in any other place we have ever seen. The yield too, is large, and the quality excellent. Great quantities are produced by the mere labor of planting and digging. Care is taken to give the ground the proper shape in covering the planted potatoes, and they are not afterwards meddled with till the next fall, and in some cases not till the following spring—the peculiarity of the winters, as before described, rendering the tubers perfectly safe through that season in the ground, as they grew. New settlers and others who have not cellars for storage, frequently leave such of their potatoes as are not wanted in fall and winter, in the ground till spring. This is the time when they are chiefly in demand for exportation. They usually bring at the dock from 50 to 60 cents—sometimes as high as 75 cents per bushel, for the Chicago market. Being well known for superior quality, they sell at an extra price. They generally yield from 250 to 300 bushels per acre, though instances are not uncommon of 400 bushels to the acre being obtained, and John Canfield, Esq., of Manistee, informed us that he had obtained over 500 bushels to the acre, ascertained by accurate measurement of the land and crop.

Mr. Elisha P. Ladd, near Old Mission, wrote in November, that his crop of potatoes this year, averaged 250 bushels per acre, and that the general average was fully 200 bushels. He was selling his at fifty cents per bushel, on the dock at Old Mission.

The potato is particularly healthy in the Grand Traverse region. Persons who have resided there for several years, state that they have never known the crop to rot, or to exhibit any symptoms of disease. Even varieties—like the Carter, and

Mercer or Neshannock—which have such a tendency to disease that their cultivation in most localities has for some time been abandoned, are here healthy and vigorous, and yield as well as they ever did in older parts of the country.

There is no doubt that the potato crop is one of the most profitable that can be grown in the Grand Traverse country, near points from which it can be shipped. It is, however, perishable and of heavy carriage, so that in the present bad state of the roads, and the absence of railroads, it cannot be cultivated for market at a great distance from water communication.

It is proper to state that there are some disadvantages connected with the potato living in the ground over winter. It has become in this section a naturalized weed. Some farmers were heard to remark that it was the worst weed they had. Where care had not been taken to dig and pick up all the tubers, the growing stalks were seen in abundance in fields of spring grain.

#### CULTIVATION OF HOPS.

The cultivation of hops has lately been introduced into several neighborhoods of the Grand Traverse country. The only plantation we had the opportunity of examining was that of Elisha P. Ladd, near Old Mission. It consisted of two acres, the first returns from which were obtained this year. The first crop is generally comparatively light, and in this case there were many vacant hills. Mr. L. writes: "I picked only 700 hills, and obtained ninety-four boxes of green hops of excellent quality. They usually yield from ten to twelve pounds per box; so I estimate the amount to be about 1,000 lbs. of cured hops. My neighbor picked the same number of hills and had sixty-nine boxes, which at the same rate will give 750 lbs. Old hop-growers from Wisconsin, who are said to be good judges, say our hops are of superior quality, and will bring the highest price in market."

## SHEEP HUSBANDRY.

Sheep husbandry is hardly as yet established in this section. Pasturage is not sufficiently abundant. Mr. Ladd and Mr. Marshall have flocks—that of Mr. M. consisting of 150. About one-half of them are full-blood South Down; the others full-blood and high grade Merino. The flock averaged five and a-quarter pounds of washed wool per head last year, which sold at 48 cents per pound. The fleeces of this year were not all taken off at the time of our visit.

Indications are favorable to the success of sheep husbandry here. All the sheep we saw were very healthy. Mr. Marshall's were all in good condition, and all the South Downs,—both ewes and lambs,—were actually fat, although many of the ewes had two lambs each. They had been fed on grass only during the season. Mr. Marshall says the Downs are more profitable than the Merinos, on account of the ease with which they are fattened and their value for mutton. Thus far he has found a ready market at home for all he has had to sell, and he has never killed a South Down that did not come to ten dollars. He can easily send his sheep to the Chicago market.

## THE TIMBER OF THIS REGION.

The prevailing growth over a large portion of the country, embracing the best soil for cultivation, is the sugar maple. Having considerable acquaintance with this species of tree, from the Penobscot to the Potomac and Ohio, the writer can safely say that he never saw such grand specimens as are to be met with in countless numbers in the Grand Traverse country. They are frequently found of a height of sixty to seventy feet without a limb, of a diameter of three feet or more at the ground, and very straight. Of course such large trees cannot stand as closely together as smaller ones; they hold possession of the ground, however, which is in many cases entirely free from undergrowth, so that the forest presents the appearance of an artificial plantation or park, through which people on horseback may readily pass in any direction.

What appears singular, judging from what is usually considered the natural habit of this tree, is that it grows here on what appears to be very dry soil—soil which is quite porous, and with a sub-stratum of similar character. It is commonly thought that this tree denotes a moist soil, such as is good for grass—a deep and rather tenacious loam being generally favorable to the growth of the sugar maple. I am inclined to think that there is more moisture in the Grand Traverse land where this tree grows, than would be supposed from its texture. In many instances, young growths of maple have sprung up where clearings have been made, and their luxuriance and density of foliage is quite remarkable—exceeding anything of the kind I have seen elsewhere. A natural inference from this is, that there is no lack of moisture.

Again, the elm and other trees which commonly grow in moist soils, are frequently found intermingled with the sugar maple on some of these open soils. The elm shoots up perfectly straight, to a great height, without branches; is so free in the grain that the trunk splits readily, and is considered about the best rail-timber to be had. The bass-wood or linden is common, and of great size. White ash is not rare, splendid specimens of the species being frequently seen. On the colder lands beech is abundant, and where the soil becomes poor, this species is mixed with hemlock, which in some cases constitutes almost the entire growth.

The *pineries*, contrary to the popular belief among people who have but little actual knowledge of the Grand Traverse country, cover comparatively but a small portion of the land. They are generally sandy tracts, of not much value except for the timber. It is not invariably the case however, that the pine land is unfit for cultivation. In some instances where there is a mixed growth of pine, oak and beech, the soil is not unfavorable to the production of Indian corn, rye, and potatoes. In the lower part of the Manistee valley, where the growth along the river was chiefly pine, but consisting to some extent of the species just mentioned, the soil is evidently better for cultiva-

tion than much land at the East which is regarded as of pretty fair quality. With proper tillage, the use of plaster, the growth of clover, the grazing of stock, and the proper application of animal excrements, there is reason to believe that much of this land may be made profitable for farming purposes.

With the exception of pine, the timber of the Grand Traverse country possesses no value at the present time. It was almost painful to see the thousands of trunks of the finest birds-eye and curly maple, the best of white ash, basswood, &c., burnt on the ground. But at present it must be done, otherwise the land would not be cleared.

#### WHAT THE COUNTRY NEEDS,

is railroad communication. If the proposed road from Saginaw to Traverse City, or some suitable point on the Lake shore, were now completed, it would open some of the best portions of the section to immediate settlement—would impart immense value to the land, its timber and other productions; in short would present the Grand Traverse country as possessing inducements to the actual settler, unsurpassed by any other portion of our whole country.

#### RAIN-FALL.

There is an impression in the minds of some people, that there is a greater deficiency of rain in this region through the summer months,—or more particularly in May and June,—than in other parts of the State. Whether this impression is well founded or not, can only be ascertained by accurate records. At present we are without data relating to the subject. The annual rain-fall should be known, as well as the manner in which it is distributed through the year.

Since the foregoing was written, a letter under date of Dec. 31, has been received from Mr. Geo. E. Steele, of Homestead, Benzie county, which comprises valuable information in regard to the yield of crops in the Grand Traverse region, for the year 1867, and other facts of importance. Mr. S. states that

he has been aided in this matter by Mr. W. S. Hubbell, President of the Benzie Agricultural Society. The following is an extract from Mr. S.'s letter:

#### FRUITS.

Results in fruit culture through this section, thus far, are very encouraging; but the culture is confined to the older settlements, and most of these are influenced by the lakes and bay. How far interior—that is, east of Traverse Bay and south and south-east of Traverse City—the common classes of fruits can be grown, remains to be demonstrated. I send a notice from the "Traverse City Herald," of some apples raised by Edwin Pulciphier, of East Bay township. They comprised samples of Rhode Island Greening, Spitzenburgh, Brother Jonathan, Northern Spy, Tallman Sweet, &c. I saw them; they were very fine.

The *Peach* crop this year was a full one; and strangers who attended the Benzie Fair, expressed the opinion that better specimens of their kinds could not be shown in the State than were there to be seen. The trees of John Bailey were very full, but were mostly seedlings. C. E. Bailey, Dr. J. B. Walker, and Mr. Younger, of Bear Lake, exhibited choice samples. *Plum* trees bore very full, and the fruit was perfect. *Apricots* were grown by Dr. Walker, of *first quality*. J. R. Barr exhibited very fine *Quinces*.

*Grapes*.—Isabella, Concord and Catawba were exhibited in perfection. Judge Ramsdell, of Traverse City, fruited the Diana, Isabella and Delaware,—all ripening perfectly. On a four-year-old Diana vine, he had seventy-five full bunches. The *Herald* states that he has set out this fall, 100 Concords, 100 Ionas, 100 Delawares and 50 Israelas. He experimented with some of these last year, and they made a growth of from four to eight feet. Judge Fowler, of Peninsula, J. S. Dixon, of Pine River, and many others, have ripened grapes this year. The past fall was very favorable for ripening fruits, and whether we can continue to raise good grapes I do not know.

*Pears.*—I can speak very much in praise of the pears grown on dwarf trees at Benzonia and other places. The fruit has been large and fair, and the trees thrifty. Your recent visit I hope convinced you that the small fruits would flourish well.

#### GRAIN CROPS.

These have this year given a good return, but they were all shortened by dry weather—especially early oats.

*Wheat.*—Experience and experiment are improving the culture of this cereal. It is demonstrated that we can raise the best of wheat, with a yield comparing favorably with other portions of the State. But thorough preparation of the ground, and clean and healthy seed are essential requisites. H. D. Campbell, of Silver Lake, writes me that in 1865, the yield was 22 bushels per acre—some pieces reaching 40 bushels. In 1866, the yield was more uniform—the seed having been better put in, and only for the dry weather, which prevented filling, it must have been *much* better, though the average was about 18 bushels to the acre, of very fine quality. This year (1867), the yield was still better in quantity and quality,—more pains having been taken in preparing the ground and seed, early sowing, &c.,—so that the yield was from 18 to 35 bushels, making an average of 25 bushels to the acre, generally free from smut. William Monroe, of the Monroe settlement, had 36 bushels to the acre, and Henry Monroe 37 bushels of winter wheat. Their spring wheat was injured by the Hessian fly—*Cecidomyia destructor*. But spring wheat is not much raised here. The wheat you saw at my place was sown on new land, September 7th, 1866. The land was not ploughed, but was well harrowed. Two and a-half bushels of seed (brined) was sown on two acres. The yield was 61 bushels. Wheat was injured some last winter by smothering, and has been so in previous years.

*Indian Corn* made a vigorous growth at first, but did not go out well, owing to the severe dry weather when the ears were setting. Ours was planted from the first to the fifth of June, and yielded twenty-five bushels shelled corn to the acre. It



was all sound and was cut before frost. That planted June 1st gave good roasting-ears in 63 days. *Dent* corn planted June 5th, gave a small yield, but it was all sound. The corn-ground was new, and was not ploughed, but dragged.

The *grass* crop was generally good. The experiments with orchard-grass prove it to be well worthy of more attention.

The *first frost* to do damage here, was on the 25th of September; but our tomatoes grew and ripened fruit after the 7th of October. Last year, I saw tobacco, three miles south of Traverse City, which had not been touched by frost on the 29th of October.

GEO. E. STEELE.

## AGRICULTURAL SOCIETIES:

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### THEIR PROPER OBJECTS AND RIGHT MANAGEMENT.

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The formation of agricultural societies, now so numerous in this and other countries, belongs chiefly to this century, though their origin dates further back. In Great Britain, the Highland Society of Scotland, the oldest in the kingdom, was formed in 1780. Some small associations of similar character may have existed on the continent of Europe at the same time. In our own country, the first steps toward such organizations were taken shortly after the close of the war of the revolution. Several gentlemen who had occupied prominent military and other positions during that contest, on returning again to agricultural pursuits, and seeing the low condition into which agriculture had fallen during the long period when the mental and physical energies of the people had been almost absorbed in the great struggle for national existence, resolved to associate themselves together for the improvement of that interest, which they well understood constitutes the foundation of the country's prosperity.

This association was organized in 1787, and was called "The Philadelphia Society for the Improvement of Agriculture." It numbered among its members, George Washington (as an honorary member), Robert Morris, Richard Peters, Timothy Pickering and other distinguished men. Pickering, who was Secretary of State under Washington, returned to Massachusetts, his native State, on leaving that office, and took an active

part in the Massachusetts Society for Promoting Agriculture, which was formed in 1792, and included among its members many of the leading men of the State—the eminent Samuel Adams being its first President. The New York State Society for the Promotion of Agriculture, Arts and Manufactures, was organized in 1793, with Chancellor Livingston at its head, and Dr. Samuel L. Mitchell, John Jay, Horatio Gates and others as members. County societies, Berkshire, Mass., taking the lead, were formed in several of the States before the close of the last century. But it was not until the war of 1812–15 that these societies became general.

What has of late years been the main feature of agricultural societies was not for several years adopted by the earlier associations. In this country, the first society which attempted an exhibition, is believed to have been that of Berkshire county, Mass., which in 1810 held its first "Cattle Show," at Pittsfield. The "cattle" exhibited, however, are said to have consisted of two grade-Merino sheep, owned by Elkanah Watson, the President of the Society. The Massachusetts Society held its first exhibition at Brighton, in 1816. This appears to have been the first *State* exhibition in the country. The Society made annual exhibitions for many years. They attracted great attention, were attended by leading agriculturists from all parts of the country, and undoubtedly exerted much influence towards the introduction of similar exhibitions in other States.

Before the establishment of exhibitions, societies directed their efforts mainly to bringing out papers or essays, in answer to questions propounded. Much valuable matter was brought out in this way—matter which even now may be read with advantage. Some societies, like that of Massachusetts, offered premiums for the introduction of specimens of breeds of domestic animals, implements, seeds, &c., which were thought to be desirable. Merino, Leicester, and Texel sheep, and Short-horn and Holstein cattle were introduced into Massachusetts under these offers. Premiums were also offered for experiments.

The Philadelphia Society published its doings in volumes entitled "Memoirs," &c.; the Massachusetts Society published its "Repository and Journal," and the New York Society issued its "Transactions." Any person who will take the trouble to look over these old volumes, will find that the men who were able to make a nation, were close observers of natural laws as connected with the growth of plants and the sustenance of animals, and that our indebtedness to them is not confined to the victories achieved on the battle-field and the advantages of a free government, but consists in no inconsiderable degree in facts established and improvements made in agriculture.

The fundamental idea in the origination of agricultural societies, was to better the condition of the farming class by introducing such improvements in the various branches of husbandry as would secure the best returns for the outlay of labor and capital. Affording amusement to the people, any further than amusement could be derived from objects of actual utility was not contemplated. This is undoubtedly the true ground-work for such associations. Of course the plan is intended to include encouragement to those branches of industry with which agriculture is connected. When legislatures incorporate agricultural societies, or provide for their organization, it is on the condition that they shall attempt the *improvement* of agriculture. It is with this view that they are allowed to draw money from the State treasury, or obtain it from the people. The matter may be regarded in the light of a contract, the officers of societies pledging themselves to use the powers conferred on them as specified.

The means by which agricultural societies can effect improvement may be enumerated as follows: 1. The holding of exhibitions at which premiums are given for specimens of superior merit or excellence in the different departments to which their supervision is extended. 2. The bestowment of money for making experiments to settle doubtful questions. 3. The publication of special papers or essays, comprising useful information.

Of these, the holding of shows for the exhibition of articles and animals is the most prominent, though not necessarily the most important. The influence of these exhibitions depends very much on the manner in which they are conducted. At the best, however, they cannot properly be considered as more than one of the various means by which a society should seek to accomplish its main purpose. Unfortunately, many societies make this their sole object, too often without due regard to management and ultimate results.

To effect the greatest good by these exhibitions, much judgment is required in the offering of premiums, and at least equal judgment, accompanied by a good degree of independence, is required in making the awards. In general the amount of the premium should be graduated by the utility of the object for which it is offered. Exceptions, however, may properly be made in reference to objects which require special encouragement for a time, or those the immediate introduction of which it is desired to effect.

An important object of societies should be to establish correct standards by which animals and things should be judged. The terms in which premiums are offered should be based on such standards, and should as far as possible convey a clear idea in regard to them. The mere use of the word *best* does not express anything as to what constitutes excellence. It is sometimes said that this is left to the awarding committees. But it is improper to leave it to them, because different men are appointed to judge the same things, at different times, and their ideas in reference to standards of merit may not agree. Thus, instead of establishing uniformity in regard to the things judged, the decisions might nullify each other, and nothing would be established. A reasonable supposition is that the society seeks to make improvement in everything for which it offers premiums, and that it has fixed certain standards in reference to which the awards should be made. On this ground agricultural societies become, as they should be, correctors of public opinion. The

animals or articles on which premiums are awarded, may properly be presented as examples for imitation.

The objects on which premiums should be offered, are numerous and need not be particularly enumerated. Unusual prominence has of late years been given by many agricultural societies to the horse. It is well known that under the name of "trials of speed," some societies have made racing and trotting matches the principal features of their exhibitions. It is not unusual that the largest premiums offered, are those for the fastest trotting. A great display is made of this in the bills, and it seems to be relied on as the greatest inducement that can be presented to the public to attend the shows. The arrangement of the grounds, and the most expensive fixtures for the accommodation of the people, have special reference to these so-called trials of speed. So much space is frequently given up to this, that other departments of the exhibition are incommoded for want of room.

The excitement incident to these displays is naturally attractive to those people who attend the exhibitions merely for amusement, especially to the young of both sexes, and the crowd which lingers round the stand, shows that the benefit which might be derived from [close examination of the more useful parts of the exhibition, is chiefly lost.

But is any real improvement effected or even contemplated by these premiums on trials of speed? We hear, to be sure, of associations,—sometimes with the pretentious title of "national,"—being formed for the "improvement" of horses. What improvement do they make, or even intend to make? Have any of them ever told us how or in what respect they design to effect this object? If it was really intended to improve the horse stock of the country, it would be natural that men of common sense and common honesty should lay down some plan for the accomplishment of this object. We have seen nothing of this kind; not a word has been published in reference to any proposed course of improvement, or to show in what respect any improvement has been accomplished by these

displays. In fact, a pretty thorough acquaintance with the manner in which these horse-shows and trials of speed have been got up, leads to the conclusion that they are chiefly intended as means of making money for the keepers of hotels, gamblers and horse-dealers. The public at large are only paid in the amusement which the occasions offer, and that, as we shall show, costs more than it is worth.

But let us look a little at the principles involved, and the results produced by the offer of premiums for the fastest trotting at short distances with light weights—a mere test of speed, irrespective of other properties. It often follows that the winning horse is in many cases one of little value for any purpose of usefulness—that in some instances he would not bring in the regular market, as much money as is awarded to him in a single premium. It is true that this is not always the result of these trials. Horses that are valuable for something besides speed at short distances and light weights, do sometimes win; but when they do, they stand no higher in the scale of honors than the mean scrubs which have done the same thing; and it must be evident that the offering of premiums for mere speed, if it has any effect at all, tends to the production of horses in which the more useful properties are found only in an inferior degree.

But the worst aspect of the case has not been noticed. Disguise it as you will by any soft words, these contests are in principle, nothing more than those instituted by gambling associations, where horses compete for *purses*, in sporting phrase. Indeed, as the public mind becomes accustomed to the spectacle, it approximates nearer and nearer to the gambler's scheme until even now, we see at the exhibitions of some of our leading agricultural societies, the most open betting on these "trials of speed."

In view of these facts, will any one contend that the scenes alluded to are calculated to improve either the breed of horses or the morals of men? But what is the argument in favor of these displays? On what ground is it attempted to justify them? Their advocates, when pushed to the wall and forced

to admit that they cannot stand on the ground of utility, claim, as a last resort, that you cannot get along without them; that they are necessary to get money from the people. But what better is that than the raising of money by any other false pretense? Admitting that the money thus obtained is to some extent appropriated to useful purposes, the course of action cannot for a moment be sustained in the face of the interrogatory—"Shall we do evil that good may come?" But does not the evil which is inevitably attendant on these displays, decidedly overbalance the good which it is practicable to effect through them? Persons who have closely watched their influence on the public morals, will have no hesitation in giving an affirmative answer to this question. The argument that they are necessary to the support of agricultural societies, is believed to be entirely fallacious. Does experience teach that the class of people who are particularly interested in mere amusements,—innocent or otherwise—can be permanently relied on in important enterprises? On the contrary, is it not well understood that their characteristic capriciousness may at any moment jeopardize the success of any undertaking? Again, the true friends of agriculture are disgusted by frivolous and immoral proceedings, and stand aloof, or withdraw the support which may have been tendered, thus depriving the society of the aid of the most substantial and trustworthy citizens—the class which all experience shows can alone be depended on for the prosecution of enterprises designed for the public good.

But perhaps it will be asked, would you shut out the horse from any participation in agricultural exhibitions? Certainly not. The horse is one of the most useful of our domestic animals, and his improvement should not be overlooked by agricultural societies. Several classes or breeds of horses are required—the most important of which, in reference to the wants of this community, is the farm-horse. This is also the class which here most needs improvement. Next in importance is the roadster—a class suited to quick traveling, with comparatively light vehicles on the road. One point of merit in this



class is, of course, speed in trotting, or at least that degree of speed which is compatible with the hardiness of constitution, and power of endurance necessary to constitute the most serviceable and valuable horse for this business. In awarding premiums on this class, it will obviously be proper to take into consideration all the properties required to make the best horse. As before remarked, one of these properties is speed, though not in a higher degree than is likely to be wanted by the horse in the performance of his legitimate duties. It will be proper that the committee under whose examination horses of this class are brought, should subject them, as far as possible, to such tests as would be adopted by a person wishing to purchase a horse for honest business. He would, of course, wish to see something of the animal's action, both as to its style and rapidity; but he would by no means think it necessary that the horse should be put in competition with others on a track at the highest practicable speed. Even if it should be desired to test the rate of speed by time, the fairest mode of doing so would be to try each horse by himself, in the most quiet way. When horses are put on a track in competition with each other, it is difficult, and in some cases impracticable, to fairly settle the question of the rate of speed of which they are relatively capable, on account of the excitement which affects them. The "green horse" from the rural districts, unaccustomed to the strange sights and sounds of such an occasion, cannot act naturally, and stands no chance with the *trained* nag of, perhaps, much less power of speed. Most persons who have witnessed such contests, must have had proof that the race is not always to the swift—that the tricks of jockeys have often more to do with the result than the speed of horses. Certainly, no further argument is needed to show that by trying horses separately, we are much more likely to ascertain their natural style of action and actual rate of speed, than under the confusion and excitement of a general contest.

But it is said the people will not attend purely utilitarian exhibitions. Admitting this to be true, does it justify societies

in pandering to a depraved taste, or aiding in the corruption of the public morals? Is it not rather the duty of societies to direct public sentiment,—to educate the people up to correct standards,—to lead them in the way they should go?

Experience, however, shows that the objection is not valid. It has been demonstrated that it is unnecessary to resort to "trials of speed," female (not *lady*) equestrianism, or any other displays of vulgarity or vice, to induce the people to attend agricultural exhibitions. The New York State Agricultural Society, one of the oldest, most useful and influential associations of this character in the country, has from the beginning, steadily refused to tolerate any of these gambling or clap-trap affairs. It has never allowed trials of speed on its grounds, and has never set apart any more ground for horses than was simply required to fairly show their gait. Yet large crowds have always attended the exhibitions of this Society—larger, on the average, than have attended the exhibitions of those societies which have introduced the objectionable displays before alluded to.

The people of our country would hardly be willing to admit that they are inferior in morals or taste, or in a desire for the improvement of the useful arts, to those of Great Britain. But in that country, where agricultural exhibitions have been held for a longer period than they have here, and where they are of late years very numerous, everything that has not a direct bearing on the improvement of agriculture, is rigidly excluded. Yet the people attend in as great numbers in proportion to the population, as they do in this country. I am sorry to be obliged to say, that the visitors to those shows generally study them more closely than our shows are studied by our people. The women of England are admirers of the horse, but they do not give their countenance exclusively to that class in which speed is the chief characteristic. At one of the shows of the Royal Agricultural Society, I saw one of the first ladies in the kingdom, both in position and character, point out to several other

ladies of high distinction, the characteristics, in figure and shape, of a massive draught-horse belonging to her husband.

Our Canadian neighbors, who are earnestly devoted to the improvement of agriculture, make exhibitions of a highly creditable character, and which are numerous attended by the people. They have no trials of speed, and allow no private shows to occupy their grounds. Their exhibitions are as well attended as ours. At a late Provincial show of Canada West upwards of a hundred teams engaged in a ploughing-match. Land suitable for so extensive a competition could not be found nearer than six miles distant from the show-grounds; and yet the contest was witnessed by 10,000 people or more. Unusually large premiums were, to be sure, offered on this occasion—the highest being nearly a hundred dollars. But in reference to practical or useful results, who will say that the money was not better expended than it would have been in premiums on “trials of speed” in horses?

It is not reasonable to suppose that our people are naturally so different from those of other countries that they cannot be influenced by similar motives. They need, of course, to have those motives presented to them; and it is only necessary to show in what direction lies their true welfare, to enlist their best feelings and most vigorous efforts.

The subject of trotting and racing horses at agricultural exhibitions, seems at last to be attracting considerable attention from persons who have the prosperity of agricultural societies at heart. W. L. Webber, Esq., in his late address before the Saginaw County Agricultural Society, observed, that “While an agricultural society, conducted as it should be, is productive of manifest good, experience has proved that a society under the name and guise of agriculture, may by mismanagement, and by its officers mistaking or forgetting the objects for which the society is formed, become rather an evil than a blessing to the community.”

After stating that the object of the society is to "promote the improvement of agriculture and its kindred arts," Mr. W. proceeds:

"To obtain the greatest benefits from such an association we must not lose sight of the objects stated in the constitution. Let us confine ourselves strictly to those objects. Let us be careful that our annual fairs do not become demoralizing to ourselves and our children, by the introduction of horse-racing, or any other gambling operations under the auspices of the society. Those who desire to risk money on the speed of their favorites, have their associations and race-grounds, where they can pursue their unlawful vocation without intruding their vices upon those who do not desire to witness them. Leave to them the races and gambling incident thereto, while we steadily pursue the objects of our organization."

"By the statute of this State, all *running, trotting or pacing* of horses for any bet or stakes, or *for any reward* to be given to the owner or rider of any animal which shall excel in speed, is declared to be a public and common nuisance, and a misdemeanor, and all parties concerned in them as betters, stakeholders, judges or riders, are guilty of a misdemeanor and subject to a fine of five hundred dollars or one year's imprisonment in the county jail, and the owner who permitted his horse to run such race, forfeits the value of his horse."

It begins to be apparent that the "fast-horse business" is operating injuriously on the interests of agricultural societies. Many of the secretaries of county and district societies in the State, in correspondence with the Secretary of the State Board of Agriculture, mention as a reason for the meagre display of articles and animals in general at the exhibitions of their societies, that the public interest has been absorbed by the horse-trotting and racing allowed on these occasions. Some say they are convinced that unless this thing is checked, it will ruin the societies. No doubt it has already detracted much from the

usefulness of societies, and if persisted in will render them only sources of evil.

The utility of agricultural exhibitions depends very much on the systematic transaction of the business relating to them. There is usually with us too much hurry, and of course confusion, on these occasions. This might be in a great degree avoided, by having the entries made a certain time beforehand. The officers having charge of the exhibition would then know exactly what to provide for. On the plan generally pursued here, it is all guess-work. The Secretary or Superintendent guesses that about so much room will be required for such and such breeds of cattle or sheep; about so many stalls for horses; but he *knows* nothing about it till the animals come on the ground. He cannot then arrange them in proper divisions—the different classes or breeds by themselves, as they ought to be. The space which it was guessed would answer for one breed becomes filled, and the contiguous space is also filled with other classes. More of the first-named come in than had been provided for, and they are of necessity sent off to some unoccupied corner, frequently at a considerable distance from those of the same class that first appeared on the ground. Such cases often occur. They perplex the Superintendent and awarding committees, who sometimes have to spend considerable time in hunting after animals.

All this trouble, as well as great liability to error in the entries, could be saved. It is just as well and even better for competitors to come into the rule of making entries in advance. They can send their lists through the mail, or present them by proxy, and the secretary or his clerk has only to make the entries as he sits quietly in his office, free from the annoyance of a questioning crowd. It is obvious that the business would be much more methodically done in this way, and most of the numerous errors that occur under the present system avoided. It would also put an end to the mean practice sometimes indulged in, of persons coming to the show at the last moment at

which entries can be made and looking round to see in what class they would stand the best chance to obtain a premium.

It is advisable, too, that at large shows, at least, the awards be made before the crowd is admitted. Without this it is sometimes impracticable to make the examinations in a satisfactory manner, and the decisions are more or less wrong. Examples of this are constantly occurring, and they give rise to great dissatisfaction. At all the large English shows the entries are made several weeks in advance, and the awards are made and the prize animals and articles designated by badges or tickets, before the show is opened to the public. Catalogues are printed comprising everything belonging to the exhibition—the number of each entry, the name of the exhibitor, a brief description of the article, and, in reference to animals, their breed, the name of the breeder, and the pedigree. In some instances the prizes are printed in the catalogue; in others a separate catalogue containing the prizes accompanies that of the entries. These catalogues are sold at the gates, and the visitor is at once put in possession of the means of learning everything relating to the show, without the necessity of asking a single question.

The offering of premiums for the settlement of doubtful questions, under proper direction and management, may accomplish much good. It should be a leading object of all associations to do that which cannot be done by individuals. The labor and expense required in conducting experiments is too great for private enterprise, especially when no monopoly of the benefits arising therefrom would be enjoyed. It is manifestly the duty of public institutions like the Michigan State Agricultural College, to engage in experiments relating to agriculture; but agricultural societies might, with great advantage, operate in the same field, and in no way could a portion of their funds be better used.

A committee chosen by a Virginia Agricultural Society, several years ago, to inquire into the subject of premiums for the improvement of agriculture, and to make suggestions in reference

to the course to be adopted, made a report, in which, among other sound observations, occurs the following:

"Accurate experiments on any doubtful points, are always valuable to agriculturists in general, but in far the greater number of cases, cause loss to their conductors. Hence, the peculiar propriety of encouraging experiments by premiums. An agricultural experimenter may, possibly, by some fortunate discovery, compensate himself for his previous losses; but such good fortune is rare, and most persons who have rendered signal services to farmers, have done so by great individual sacrifices. This great obstacle is not the only one which opposes the correct method of investigation, and the advancement of the science of agriculture. Notwithstanding the certain attendant loss, every zealous farmer is to some extent an experimenter. But the results of his experiments are not known except to himself, and even to him may appear useless, but which if compared with others, would lead to important consequences.

"To prove by experiment that a doubtful practice is wrong, would be as valuable to agriculture as if the result should show that it is right. But on many such points, proof has perhaps been obtained fifty different times, by as many farmers having no communication with each other, and still the result may be unknown to all but the several experimenters.

"Premiums for experiments conducted with care and accuracy, and repeated under different circumstances until the point in question is clearly settled, could not fail greatly to promote the improvement of agriculture. The advantage derived would not be inconsiderable, even if such premiums had merely the effect of giving publicity to the numerous experiments which are made with other views, and which would otherwise never be known. But we can scarcely doubt that their number could be greatly increased, be directed to the most important objects, and conducted with far more care and attention, when in addition to the hope of being honored with a premium, the experi-

menter would expect to profit by the labors of many others engaged in similar researches.

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"When in addition to the obstacles already mentioned, to experiments being made by separate individuals urged only by zeal for research, we consider the time and labor, the unremitting attention and perfect accuracy required, the sacrifice is evidently too great to expect from any one unaided farmer. To fix beyond doubt the most inconsiderable fact requires many experiments, to be made on different soils, in different seasons. When results are intended to be compared, the slightest difference in the process may sometimes make a false conclusion appear true. Hence most private experiments are made with so little care as to be scarcely satisfactory to their conductors, and of no value to other persons. Societies, by premiums, may effect whatever in this respect is wanting. They can point out the most important subjects for experiments, require attention to everything which can affect results, and unite the labors of many for a single object."

The reports and experiments would comprise useful matter, and in connection with special papers and essays, of which every society should bring out some annually, would be valuable for publication and distribution. It is much to be regretted that but few agricultural societies bring out much matter that is worth preservation. In many instances this point seems to be wholly overlooked. The parade and excitement of the annual exhibition—and this too frequently of the objectionable character already spoken of in this article—seems to constitute the principal, if not the only aim. By the course now provided for by law in Michigan, of the agricultural societies reporting their proceedings annually to the Secretary of the State Board of Agriculture, all matter obtained that is worthy of preservation, is printed by that officer in his annual reports. Each society, however, receives the proper credit for whatever is



published—the matter appearing as the doings of the society from which it emanates.

If the officers of agricultural societies would take this matter seriously in hand, they might greatly increase the usefulness of their respective associations, besides adding largely to the fund of valuable information. If it were not for the appearance of invidiousness, societies in the State might be named which present examples of this kind that are worthy of imitation.

## IRRIGATION.

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The application of water to land artificially, for the benefit of plants, is of great antiquity. Those regions of the Old World which were in ancient times most fertile and populous—as the valleys of the Nile, the Euphrates and Tigris,—owed their productiveness, in a great degree, to this cause. Egypt, which was long regarded as the granary of the world, was almost a rainless country, and but for the periodical overflow of the Nile would have been a barren waste. It is true that this overflow cannot properly be called *irrigation*; but the effect of the annual floodings in adding to the fertility of the soil by means of the sediment deposited, and the supply of moisture to crops, is manifest. In addition to this natural application of water, actual irrigation was resorted to in this and other eastern countries, by rude appliances for raising water from streams and wells, and distributing it by means of canals and ditches through cultivated fields.

Even in our own country, some of the most productive sections,—as parts of California and Utah,—are dependent on irrigation for their bountiful crops. Yet the general advantages of this system, and the benefits which might be derived from it by our farmers, are but faintly realized.

Perhaps there is nothing in which our agriculture is so much behind that of some European countries, as the neglect of this cheap source of production. Under favorable conditions, no other means of increasing the yield of certain crops will produce so great returns in proportion to the expense, as irrigation.

The result, too, is clear gain; it is produced from an element which would otherwise be turned to no account, and nothing else whatever is diminished in value by its use.

It is chiefly for the grass crop that irrigation is practiced in Europe, and it is for this that it would be most useful in this country, except in a few localities. In the Eastern States some use has been made of water for this object for many years, though to nothing like the extent that it might have been advantageously carried. The more varied surface of that section of the country, presents much greater facilities for irrigation than the level region of the West. But in Michigan there are thousands of instances where water could be made available for this purpose with very profitable results.

As an example of what may be done by irrigation at little cost, some account is herewith given of its practice on a farm now owned by Mr. R. Bradley, of Brattleboro', Vermont. The writer had the opportunity of examining the farm alluded to in the fall of 1867, having given it a more thorough inspection several years previously, when it was in possession of Mr. Clark Rice, by whom the system of irrigation was established. The farm is situated on quite a high hill, near the summit of which is a basin comprising several acres, which was formerly a boggy swamp, and the source of a small stream which meandered through the fields below. By making a dam of a few feet in height along the lower edge of the swamp, a reservoir was formed which holds a large quantity of water. The elevation of this reservoir is such that water can be taken from it over the greater part of the farm, and might be carried over portions of the adjoining farms.

About seventy acres are irrigated, though the water is not let on the whole tract every year. Irrigation is only practiced with the grass crop; hence when the land is under cultivation, as more or less of it is every year, the water is shut off. Some portions of the land, however, are permanently in grass, and these are regularly irrigated.

The system was commenced by Mr. Rice, nearly thirty

years ago. He began in a small way, in order to ascertain whether it would be an object to adopt the practice on a large scale. The first results were so satisfactory that it was determined to go into the business systematically, and for the past fifteen years or more, the plan now pursued has been generally followed. The water, soon after it leaves the reservoir, is divided into several main channels by which it is carried to different fields, where it is made to flow in thin sheets over the grass.

It is the common practice to let the water on in spring before the snow is gone; sometimes the snow is several feet in depth over the whole surface when the water is turned on. The effect of the water is to melt the snow next the ground, slowly, so that after a while there is a space between the snow and the grass. The water also thaws the ground, and from the heat thus imparted, the grass soon starts, so that by the time the fields are bare, they become beautifully green.

The water is kept running on the grass till about two weeks before haying is commenced. It does not, however, run constantly on the same ground; all parts of the meadow are almost daily examined, and the water on different portions increased or diminished, or shut off altogether, as circumstances require. This is easily done by closing certain channels with turf and opening others with a hoe. As soon as the first crop of grass has been cut, the water is flushed over the ground, and the gray stubble is soon hidden by a luxuriant second growth. Most of the irrigated land produces from a ton and a-half to two tons of hay per acre at the first cutting, and an after-growth equal to half or three-quarters of a ton to the acre, which is sometimes mowed and sometimes fed off.

It is considered important that the water should not be let on the meadows very early, if the ground is bare. Considerable injury was once sustained in this way. The water was let on in March, and the weather being very cold, it was frozen firmly to the ground. The flow continuing, the ice accumulated to the depth of a foot over several acres. When the ice

finally melted, the grass was found to be totally dead, making it necessary to plough and re-seed the land.

It has here been demonstrated that the land may be kept in grass permanently by irrigation, and that neither the quantity or the quality of the crop will deteriorate. A portion of this land has been irrigated twenty-five years successively, and the principal change in the crop has been that it becomes rather finer from year to year. One lot has been irrigated annually for thirty years, and all the manure it has had in this time besides water, was a top-dressing of compost consisting of one part yard manure and two parts muck, applied seventeen years ago. The dressing increased the crop for one or two years, but it has always been heavy. All the hay from the irrigated ground, is of excellent quality.

It should be stated that a large portion of this land is so dry as to need no artificial drainage. Much of it is excellent for cultivated crops. It is only necessary to keep the water from it for a few days and it will break up in a friable condition, producing fine crops of Indian corn, potatoes, or small grains. It is a mellow loam sufficiently retentive of moisture without being wet. The underlying rock, which is micaceous slate, allows the water of the subsoil to percolate through it. If it were not for this natural drainage, it would be necessary to drain the soil artificially to render irrigation advantageous, as where water remains long in contact with the roots of plants, it produces injury.

#### THE IRRIGATED LAND GROWS RICHER.

Some facts have been noted by the occupant of this land in reference to irrigation, which corroborate statements which the writer frequently heard in England and Scotland, viz: that land actually grows richer from the effect of the water. In one instance, a piece of ground was ploughed, a portion of which had been irrigated for several years. The land had considerable slope, and a portion of it was so high that the water could not readily be taken over it. The channel was therefore taken

as near the summit as practicable, leaving a third part, perhaps, of the field above the water-furrow. The water being shut off for the season, the land was ploughed and planted to Indian corn, the whole field receiving similar treatment. As soon as the crop had fairly commenced growing, the dividing line between the land which had been irrigated and that which had not, was plainly to be seen in the greater luxuriance of the corn on the irrigated portion. This difference continued to the harvest, when the greater yield on the irrigated land was found to be so marked that, to use the words of the proprietor, "a person could tell to a foot when they crossed what had been the line of the upper water-furrow." The same result attended a crop of oats which followed the corn on this land.

When it is considered that the irrigated land had produced for several years heavier crops of grass than the other part of the field, the conclusion that the water had added to the actual richness of the soil, is the only one that will account for the result. It should be stated that the part of the field not irrigated had greater advantages in respect to ordinary fertility than the other part, as it was nearer the barn and yard where the live-stock of the farm was wintered, and would naturally receive some benefit from the wash.

The fertility imparted to land by irrigation is a very important point, and a strong argument in favor of the practice. Some persons may be inclined to doubt the fact, but if, in the language of sacred writ, "the clouds drop fatness," why should not the drops when collected and properly applied, produce the same result as though they had fallen immediately from the clouds? A full explanation of the effect here attributed to water, may not readily be given. We know, however, that water has a powerful solvent action on soils. Professor Voelker, in a paper of which a portion is herewith appended, states that "on the London clay, heavy showers of rain, which in a measure irrigate the land—for sometimes the water remains for days on the meadows—have more effect than even London manure." He attributes this result to the large quan-

fity of fertilizing matter rendered soluble by the water. We know from chemical investigation that rain-water contains some of the most important elements of plant food,—as carbonic acid and ammonia,—and we know that the soil has the power of absorbing and retaining, to a certain extent, these substances; and this partially explains why irrigated lands grow richer.

THE MEANS BY WHICH IRRIGATION MAY BE PRACTICED,

must depend in a great degree upon the topography of the country, and the supply of water at command. The general circumstances of a large portion of our Western States seem not dissimilar to those regions of the Old World, to which allusion has before been made, as having been rendered highly productive by irrigation. The means there resorted to were various. Besides raising the water from streams by machinery, we are informed that basins were formed, which were filled at times when water was abundant, and held in reserve against seasons of drought. Why may not similar reservoirs be used in this country? There are numerous situations where they might be filled by the surplus water from rain and snow, and from which crops might be irrigated by a natural flow. In other cases it might be necessary to raise the water to such elevation as would admit of its proper distribution. Wind could be advantageously used as a power for performing this labor. It is not necessary that the power should be constant; if the reservoir is of suitable capacity, a supply of water may be kept on hand against all contingencies, even if the machinery was in operation but a small part of the time.

THE PROPERTIES OF WATER WHICH RENDER IT MOST VALUABLE FOR  
IRRIGATION,

will be well understood by the following extract from a lecture by Dr. Voelcker before the English Royal Agricultural Society:

In speaking on the general principles that ought to guide us in the application of water for the irrigation of land, I must allude to the great variety of opinion which prevails with re-

gard to the cause of the efficiency of water. Some ascribe its beneficial effects altogether to the matters dissolved in the water. We hear some asserting that none but muddy, or foul, bad-smelling waters are fit for irrigation; whilst we have the trust-worthy evidence of men who have applied perfectly clean and bright water with the most excellent effect to their lands. Again, we find some maintaining that water ought to be soft in order to produce a beneficial effect. On the other hand, we hear it stated that hard waters are the best for irrigation. Some ascribe the good effects to the carbonic acid dissolved in the water. Others even maintain that it is the carbonic acid in the water which does the mischief that is occasionally observed. Further, the warmth of the water is by some considered the sole fertilizing agent, whilst others do not hesitate to say that the coldness or warmth of the water has nothing to do with the beneficial effects.

I might have alluded to other matters as showing that there is a great diversity of opinion prevalent upon this subject, but it is not necessary. It might not be altogether unprofitable, however, to inquire which are the right views and which are the views that are evidently founded on misconceptions or prejudice. To render my subject more perspicuous, it would, perhaps, be well if we glance for a moment at the action of waters on soils. For I have noticed that in all the papers which treat on the efficiency of water for irrigation purposes, the soil is left altogether out of consideration. We hear more discussions on the quality of the water; but a very few illustrations will show you at once that it is in vain to discuss the qualities of water. Without reference to the quality of the soil we shall never arrive at a satisfactory conclusion as to the kind of water that is most desirable on land of a particular description. We know that in our immediate neighborhood, on the London clay, heavy showers of rain, which in a measure irrigate the land—for sometimes the water remains for days upon our meadow-lands—have more effect than even London manure. It is a well-known fact that in bad seasons—that is,



when there is little rain in the spring—manures applied to the land have no effect; and in the favorable seasons, when heavy rains fall during the spring months, manures are not required, because the rain does more good than all the manures the farmers can possibly apply to land of that stiff tenacious character which is so conspicuous on London clay. Here, evidently, the water dissolves the fertilizing matter out of the soil. It must render soluble a very large quantity, for we obtain a large produce of grass. On the other hand, we find that even on well-manured soils of a purely sandy character, the water, when it falls copiously in the spring, has the effect of washing in a very great measure of soluble matters, such as nitrate of soda, and even guano. Whilst, then, on sandy land pure water does not produce a decidedly beneficial effect, on other land it has the contrary effect. This shows plainly that the effect of water is different on different soils, and what pure rain-water does will also in a measure be done by natural spring waters. Let us then, for this reason, glance for a moment in a general manner, at the action of water on the soil; for, as I said, it is only by considering the properties of water in connection with the properties of the soil that we can hope to arrive at any satisfactory conclusion in regard to the water which is most useful for irrigation.

In the first place, I notice that water carries air into the soil. I say into the soil, for I take it to be a well recognized principle, that on irrigated meadows it should not merely flow over the soil, but also percolate through. The soil for this reason must be porous; not only its surface drained, but its under-drainage must be either naturally good, or rendered perfect by art. In bringing down the air, then, into the soil, and with it fertilizing matter—ammonia and carbonic acid—from the atmosphere, it also carries along with it chemical means, which render both organic and mineral fertilizing matters soluble and fit as food for plants. First, the organic matters are rapidly destroyed by the action of the air; the nitrogenous matters are converted into nitrates, which we know have a most powerful

stimulating effect on the growth of all vegetable produce. The nitrates which invariably occur in all drainage waters, and which are also found in all natural spring waters, are evidently the products of the oxydation of organic matters, present originally in the soil. There is a wise provision that no organic filth should accumulate. The air which is carried down in the water used for irrigation, brings oxygen into immediate contact with those organic remains, destroys them, and converts an obnoxious material into one that is of the greatest importance as an article of food to the plant. The change water produces on a variety of mineral matters is no less important. I just now observed that all natural water, (rain-water as well as spring water,) invariably contains carbonic acid in solution. This carbonic acid acts as a solvent for many mineral matters, which are insoluble in pure water. Coming from rocks that contain small quantities of phosphate of lime, it dissolves this important constituent, and renders it available for the use of the plants. Again, water charged with carbonic acid, decomposes some of our natural silicates, and renders available mineral as well as organic food.

Lastly, water carries warmth into the soil. It is well known to all scientific men that water possesses its greatest density at  $40^{\circ}$ , which is  $8^{\circ}$  above the freezing point of water. Therefore, water, whenever it exists in a liquid state, must always be of a considerable higher temperature than the atmosphere at a temperature just barely enough to freeze water, or even above it. Supposing the temperature of the atmosphere to be  $36^{\circ}$ , we cannot find water at that temperature. It is impossible, because water has its greatest density at  $40^{\circ}$ , or still  $8^{\circ}$  above the temperature of ice. But generally the temperature of natural springs is considerably higher at the time of the year when irrigation is most successfully practiced in our fields—that is during spring or the colder months of the year. On an average, perhaps, the temperature of our natural spring waters may be said to be about  $10^{\circ}$  above that of the air during the months in which irrigation is practiced. But with regard to the temperature of

our natural springs, we find indeed great variations. Whilst some are cold during the summer, they feel warm during the winter; but when tested with the thermometer they will be found of a uniform temperature throughout the year; they are not affected by the temperature of the atmosphere. These are precisely the waters that are considerably warmer during the winter months than the temperature of the surrounding atmosphere, and I take it that such waters, other circumstances being equal, are particularly useful for irrigation purposes, as they convey into the soil and to the roots of the plants, a considerable degree of warmth.

Now, these may be said to be some of the chief benefits that arise, speaking generally, from the percolation of water through the soil. I pass on now, to speak more particularly of the most desirable qualities of water used for irrigation. Perhaps I can do this best by making some remarks on waters, in the order in which they are useful to the farmer for irrigation purposes. The best water for irrigation, is no doubt *sewage water*, because it is a natural water, which contains refuse excrementitious matters, that are exceedingly useful on account of the fertilizing agents they contain. In no natural waters do we find the amount of ammonia or the amount of phosphoric acid that occurs even in the most delicate sewage; and as ammonia and phosphoric acid, perhaps, also, potash, which occurs in sewage in appreciable quantities, are fertilizing matters of the greatest importance, we ought not to waste them, but apply them to the land, if possible. In percolating through the soil, the organic matters are destroyed; they are converted into nitrates, the greater portion of which, no doubt, is rapidly taken up by succulent produce, which ought, I believe, to be generally cultivated on irrigated lands. Rye-grass ought to be extensively, and perhaps exclusively, grown on soils peculiarly well adapted for irrigation, in order that the soluble matters, as soon as they become available, may be elaborated into vegetable produce, and that the good things, after being produced on the land, should not be afterwards washed. Do, however, what we will, we can-

not prevent altogether, the waste of a great deal of fertilizing matters in the drainage of irrigated fields. This is a great fact, well known to men who have seen the irrigated meadows on Lord Hatherton's estate, at Tettersley, in Staffordshire, where drainage waters are used with very great benefit. And I would observe that I have strong reason for believing, that drainage water is occasionally more useful for irrigation purposes than the natural springs of the locality. On highly-manured fields we cannot doubt that water in passing through the land, actually takes out more in the drainage-water than it imparts to the soil. It is quite true that in other instances, the water itself conveys food to the land; but when the land is highly manured, or, if the soluble matters are, as in the case of sewage, brought on the land in great abundance, a great deal of fertilizing matter will pass away in the drainage water. In proof of this I may mention two analyses of water, that I find in the third Report of the Commission which sat to inquire into the best mode of distributing the sewage of towns. That report has been recently issued, and at page 48 it is stated that the sewage on passing through the soil contained in solution 44.87 grains per gallon of sandy matter, while the drainage contained 37.52; thus showing that a considerable quantity of soluble matter is retained in the sewage. It is true that most of the ammonia has been absorbed, during the passage through the soil; for the 5.74 grains originally present in the sewage, became reduced to one grain; still there is one grain in a gallon left. What is of yet greater importance is the fact—that while the sewage contains no nitric acid, the drainage contains no less than four and a fraction per cent. of nitric acid; showing how large a proportion there was of nitrogenous matter, and even of ammonia. For I believe that ammonia is capable of oxydation and being largely converted into nitric acid, which is, perhaps, the very form in which it should be presented to the growing plant. In several drinking waters, which, I am sorry to say, are no more fit for drinking than for irrigating purposes, I find a larger proportion of nitric acid, and indeed, the presence of

appreciable amounts of nitric acid can be detected in all natural springs; for which reason, there is, perhaps, no water, and particularly no drainage water, which is not fit for irrigation purposes. Still, upon this subject, we have very scanty information, and it is just one of those matters which I should like thoroughly to investigate. I should like to ascertain what quantity of water goes on the land in the natural rain-fall, or the natural springs that are made to flow over it; what quantity passes out of the drain, and what we have in the drainage water; because the settlement of this question will throw light upon the exhaustion of soils, of which we have heard so much.

It is impossible to restore to the land with benefit what we take out of it. The natural resources of loss are far greater than the resources of loss occurring in our fields by the matters that are removed in our produce. Perhaps it will clear our ideas on the subject of exhaustion and permanent deterioration of our fields, if this subject is thoroughly investigated. I therefore propose to go thoroughly into them, and examine not only the waters that are best fitted for irrigation, but also the drainage water; and what I stand in need of is this: I should like some practical men who are taking an interest in this important matter, to apply gauges for measuring the quantity of water that falls on the land and the quantity that passes through the drains on a given acre. This would materially assist me in the inquiries which I propose to undertake.

Sewage water, then, is no doubt, the most useful water for irrigation. And whilst dwelling on this subject, I would allude to the differences of opinion that are sometimes heard expressed. Some maintain that it is a perfectly bright and clear sewage that is best adapted for irrigation. Others say that the muddier the sewage is, and the more suspended matter it contains, the better. I contend that a moderately clear sewage is better than very muddy sewage, for this reason; that sewage that contains much suspended matter is apt to produce on the surface of the soil, especially if the soil is not very porous, a silicious film, which dries and chokes up the pores of the

soil, and in this way does mischief. If the coarser particles are skimmed off by the sewage being passed through a grating, and the whole suspended matter finds its way into the sewage, it will do good if the matter is properly distributed. We need not be particular in filtering the water to a nicety, but should be careful not to allow too much of the suspended matter to flow on the land, especially if it is more retentive than purely sandy porous, on which sewage application is most efficacious. As a matter of curiosity, I have brought with me a sample of the Maplin sands to which I am inclined to think irrigation with sewage will be useful. It is supposed that this sand contains some clay, not much; and also some other fertilizing matters.

Passing on to another description of water, next in efficacy to sewage, I would observe, that waters that contain a considerable quantity of *debris* of rocks are not useful for irrigation. Nile water contains a vast amount of fertilizing matter to the naturally sterile plains on the banks of that river. Some time ago I made an analysis of Nile water, both of water taken at the rise of the flood, and of the water taken when the flood was at its height. At the latter stage the quantity of solid matter carried along is four times as great as at the time when the Nile begins to rise, and it is chiefly in the deposit of this solid matter that we have the fertilizing matter resident. Nile water, when deprived of its fertilizing matter, is a pure water, and contains only ten grains per gallon of solid matter in solution, and perhaps the application of these muddy rivers can hardly be called irrigation proper. It is more the *warping* than the irrigation of land. Suffice it to say, that muddy streams which contain large quantities of suspended mineral, also organic matter, are chiefly useful in depositing new soil.

I pass now to another description of water—waters which have an equal temperature throughout the year. Water of that kind is considerably warmer in winter than the atmosphere of our fields. We have some observations made upon this point by Mr. Whitley, of Truro, in Cornwall; also by Mr.

Robert Smith, who has examined several springs in Exmoor, in Devonshire. I need not mention the particulars. It is enough to say that both these gentlemen are of opinion that the temperature of irrigation water during the spring months is 10 degrees higher than the temperature of the air. Thus a considerable quantity of heat is carried into our soils. Waters of a uniform temperature usually come from deep springs; and deep springs generally contain more mineral matter in solution. If water passes through a thin layer of soil or rock, it has not much time to dissolve the mineral matter. When it percolates through a large body of soil and an extensive layer of rock, it dissolves more mineral matter; and that may be another reason, and I have no doubt that on examination it will be found one of the reasons, why waters that are warm in winter are more beneficial for irrigating purposes than waters the temperature of which is influenced by that of the air.

I do not think hardness in water is prejudicial to vegetation. I can, indeed, give practical evidence to the contrary. Some of the irrigated meadows in the neighborhood of Cirencester, and in other parts of Gloucestershire, are irrigated with very hard water, and the effect produced on them is marvelous. I can conceive that on some land the lime that is conveyed to it in the shape of water is of no advantage; and indeed the irrigation of a chalky soil with calcareous water cannot be very beneficial. But I cannot conceive how lime in water should have an injurious effect. Let me give you an illustration how apt men are who perhaps take a little too much credit for their practical sense, to theorize, notwithstanding their strong protestations to the contrary. Practical writers on the subject of irrigation have remarked that soft waters are good because their softness is due to the soapy constituent of potash or some kind of alkali. It is the hard waters that usually contain the potash and soda, for the simple reason that in order that mineral matters in the soil may be dissolved, the water must go through the soil, and that in the dissolving of lime, magnesia, and other mineral substances, the potash and soda

must also be dissolved. As a matter of fact I may mention that it is the hard waters that contain alkalis, and not those which feel greasy and soft; these last are soft simply because of the absence of mineral matters, such as lime, oxide of iron, and magnesia.

The best spring waters for irrigation are those which contain the largest quantity of fertilizing matters,—and especially of mineral fertilizing matters,—in solution, and which contain also the most heat, and are thus in the best condition for yielding to the soil over which they pass, both food and warmth. In conclusion, I would allude briefly to the waters which are either altogether unfit for irrigating purposes, or require special treatment to fit them for irrigation. It is a well-known fact that waters rising from peaty or boggy ground are frequently quite unfit for irrigation—that so far from doing any good, they positively do harm. I have found it stated that it is the tannin dissolved in the water that does mischief; but this is evidently a mistake. Tannin is a substance which is very rapidly destroyed. It is one of the substances which are very readily affected by atmospheric influence. Indeed, tannin, when subjected to the action of the air, loses its tannic properties very rapidly, and care must be taken to bring those materials which we want in tanning as soon as possible in contact with liquids containing tannin. We use solutions containing tannin as a test to ascertain the presence of oxygen. Tannin, then, is evidently not the injurious thing which it is supposed to be, when it is present in peaty waters. Nor are the organic acids which are known to the chemist under the name of ulmic or humic acids as injurious in water as some have considered them. In peaty waters the quantity of these acids is but small; and it is very doubtful whether humic acids produce any injurious effect on vegetation. But there is frequently present in peaty water, sulphate of iron, or green vitriol, and it is this constituent that does all the mischief. Waters containing this ingredient are recognized by the ochery deposit in following along the crevices; and waters which deposit this ochery matter should not be



used to irrigate our fields. Sometimes waters which flow through even a small portion of the soil, especially if the soil be calcareous, are deprived of this ochery matter, and become again fit for irrigation; but in nine cases out of ten it is the sulphate of iron which occurs in waters rising in peaty localities that does the mischief. I have here a sample of peaty soil, in which you can see the sulphate of iron crystallizing out. My attention has been directed to the presence of sulphate of iron, rendering the soil unfertile by producing this ochery deposit, which has killed the vegetation.

In peaty and heathery soils we often find this sulphate of iron, and the waters there cannot be used for irrigation. A few days ago the Rev. Mr. Clutterbuck sent me from his park, near Abingdon, a sample of waters which are perfectly useless for irrigation. Then, again, I would observe that waters which contain too large an amount of saline matters are injurious for irrigation. Of all waters that should not be used for irrigation, I would mention sea-water. However useful salt may be as a fertilizer in small quantities, it is decidedly injurious when applied to the land in the shape of sea-water, in large doses.

As a further illustration of the benefits of irrigation, the following extracts from a lecture by Professor Coleman before the Central Farmers' Club, England, together with some of the remarks following the lecture, by members of the Club, are given:

Water, which, as we have seen, is so injurious when in excess, may yet, under proper management, be made of great use in fertilizing grass land. Irrigation has been practiced from early times. The merit of the discovery [in reference to England], is claimed by one Rowland Vaughan, who laid out water-meadows in Herefordshire, during the reigns of Elizabeth and James I. The inhabitants of South Cerney, a village in Gloucestershire, on the river Churn, also lay claim to the honor. A tradition is current that the practice was introduced by a wealthy farmer of South Cerney, one *Welladvise*.

Irrigation in this country is most successful on land that possesses a porous subsoil and a natural drainage, by which the excess of water can escape. In such circumstances irrigation proves of great value, supplying moisture which fertilizes, but does not make the soil cold, or prevent the circulation of air. If strong lands are irrigated, we must take care to have the subsoil very thoroughly drained, and the surface carefully leveled, so that the water may nowhere stagnate, and even then we shall find that the produce is not as healthy as that from a dry, porous soil. A great distinction should always be made between irrigation proper and flooding; in the former case the water regularly flows over the surface, and should be always in motion, gently trickling. In the case of natural flooding, it comes and goes in a most irregular and uncertain manner, and although leaving valuable sediment, the water often remains on for weeks at a time, becomes stagnant, and poisons the grass. Circumstances are the best guides in this important operation. According to the Rev. Mr. Wright, who described the South Cerney system, the water should be turned on in November, and kept on three weeks. During December and January, the great point is to shelter the grass from frost, &c.; at the same time it is necessary every ten days or a fortnight, to take the water off entirely, in order that the land may get aired; otherwise the roots of the grass will rot. [It is scarcely necessary to say that these directions do not apply to the climate of Michigan. Probably March and April would present here, somewhat similar circumstances to those under which irrigation is advised by Mr. Wright.—S. H.] Care is also necessary to see that the water flows regularly and evenly over the surface. In February, great care is required, and much depends on the judgment of the *drouner*. If the water remains on too long, a white scum forms, which is injurious to the grass; if taken off and a sharp frost follows, the grass is cut up. Water in February should remain on about a week; then taken off altogether for as long a time, securing, if possible, one dry day after removing the water. In March the early feed is ready. The

sheep may be folded over until May first; then a week's water will start the hay crop.

There are many instances in which the circumstances would allow of irrigation, but either indolence or ignorance of its benefits, prevents its being carried out. The necessary conditions are a porous subsoil, land lying on a gentle slope, contiguous to and somewhat lower than the stream, and means to get rid of the water. In rough, uneven ground we must lay out a considerable sum in leveling the surface, without which our water will do more harm than good; and it is because sufficient attention has not been paid to this, and the water allowed to stagnate in low spots and miss much of the ground, that irrigation is so often worse than useless. We may say as a general rule that water will prove most beneficial when the land regains its soundness, and walks dry in from 12 to 20 hours. Catch-meadows are suitable for hill-sides, when the supply of water is limited. They are less costly in preparation than the last described, but seldom ensure an equal distribution, and used water is generally inferior.

The advantage of using water will depend in a great measure upon the care and attention we bestow, and upon the nature of the water. Some streams are known to be peculiarly suitable, and produce greater effects than others. Generally the best results are produced on the land where the water first irrigates. Water may be used over and over again, but as a rule, those meadows nearest the source are most valuable. Mr. Wright, on this subject, says the first or highest part of the catch-meadow will be much improved; the second may reap some benefit; but the third which receives the exhausted, thin, cold water, will produce an unprofitable crop. Our farmers never choose more than a second use in the same meadow—calling it *small beer*.

That land under favorable conditions may be greatly increased in value by irrigation, is proved by the high rents which are paid for such land. The system is much adopted in Wilts, Dorset, Hants, and especially Gloucestershire, where the valley

of the Churn exhibits very fertile tracts. On this river there are about 1,000 acres of watered meadows, supposed to be improved by irrigation £2 an acre of yearly rent over their original value. The advantages consist not only in the increased supply of grass, but in the early feed, which thus becomes most useful for ewes and lambs. Care, however, is required in feeding, inasmuch as the grass is often watery and unmatured, and especially in a wet cold spring sheep are apt to scour if not supplied with some dry food. The feed from March to May is considered worth £1 1s. an acre. Shut up early in May, after being watered for a few days, there is generally an abundant hay crop by the beginning of July: two tons per acre is not unusual. After which a good soaking will start an eddish [second crop] worth at least 15s. an acre. The cost of maintaining the ditches, flood-gates, &c., amounts to about 6s. an acre. The best water-meadows are found in the valleys of limestone formation, as oolite and chalk, for example, since here we have a fine loamy soil on a porous subsoil. The roots of the grasses are much benefited by the thorough soaking, and the soil contains mineral food which the moisture conveys to the roots.

In the discussion which followed this lecture by Prof. Coleman, Mr. James Thomas said: "The trampling of sheep did much to benefit clover by consolidating the land; just as the old agriculturists had found their clover best on the headlands which had been trampled by horses. \* \* \* As regarded drainage, he had found in his own experience, and he had heard others say the same thing, that land which was intended exclusively for the feeding of oxen might be over-drained."

Mr. Robert Smith, of Emmett's Grange, South Molton, Devon, spoke of hill-side irrigation as practiced in his neighborhood: "The mountain streams were collected together and spread over the hill-side with considerable advantage. These are termed *catch-meadows*. He had some fifty acres of these water-meadows, and the land had greatly increased in value.

Irrigation, indeed, was so important that it was a subject of itself, and one which required the most mature consideration. In fact, irrigation had not received its proper share of support. For instance, the quality of the water had much to do with irrigation; gravitation had a great deal to do with it, and lastly, the principle of warmth had more to do than anything else. Some years ago he wrote a paper for the late Mr. Pusey, on the catch-meadows of Exmoor, where he described the practice which he still followed; and instead of entering into the subject then, he would refer those who wanted to know something about catch-meadows to what he said about them in that paper. The chief feature of the water-meadow, he thought, was not altogether the growth of succulent grasses which might be turned into hay, and made valuable in that way, but for feed. For instance, when they saw a barren field on one side of a hill, and a verdant meadow on the other—when they saw stock starving on the one hand, while others were getting fat on the other hand, as he had done in Devonshire—they had there an illustration of the value of water-meadows. As regarded warmth, they all knew that, practically, climate ruled everything. One person might speak of his barley-cultivation, another of wheat-cultivation, and a third of grass; but climate governed the whole. When, therefore, they saw a tendency in nature to assist grasses, it behooved them to assist nature, and to get as good grasses as they possibly could."

## CHEESE FACTORIES IN MICHIGAN.

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The business of cheese-making by the factory system, has increased rapidly in Michigan within a year or two. Instead of being dependent on other States for the supply of cheese, probably nearly enough for the consumption of our population was made in the State the present year, and the prospect is that the business will be so much increased in 1868, that the article will be exported to some extent. Whether competition will be so great as to seriously affect the profits of the business, cannot now be determined. The low price of wool, of the description which is most largely produced in Michigan, and the great slaughter of sheep which has lately taken place, tends to turn the attention of farmers to dairying, of which cheese-making is now the attractive branch.

The Secretary of the State Board of Agriculture visited some of the cheese-factories in the State the present autumn. One of the first which went into operation, was that of Rufus Baker, of Fairfield, Lenawee county, some account of which was given in the Secretary's Report of last year. Calling at Mr. Baker's factory on the 17th of October, we found it in as full operation as the season of the year would admit of. Very little cheese of an age suitable for selling remained on hand; it had been sold, chiefly when it was under fifty day's old,—much of it at thirty day's old,—at from 13½ to 14 cents per pound. The manufacturing and curing departments appeared to be well managed, and what little of the earlier-made cheese remained on hand, was of good quality. Mr. B. endeavors to make a softer cheese

than that generally made in New York, with less acid, and the curd is longer in the process of cooking. All the cheese made previous to October first, is what is called full-milk cheese; after that time, the night's milk is skimmed. Six persons are required to do the work of the factory—three men and three women.

We are indebted to Mr. Baker for a summary of his operations for 1867, from which we take the following:

"We opened our factory on the 9th of April, and closed it on the 30th of November—the period of cheese-making for the season being 230 days. The first half of the season was very wet, and grass grew in abundance. The last half was very dry, the feed short, and in some instances there was great scarcity of water for stock. Still, cows have done tolerably well, considering the extreme wetness and extreme dryness of the season.

"There has been delivered at my factory this season, 2,051,-625 lbs. of milk. The whole number of cows was 540; the average number 470; making an average of 4,370 lbs. of milk per cow, or 460 lbs. of cured cheese, which nets patrons 12 cts. per lb., or \$55 20 per cow. It took 8 7-10 lbs. of milk for one pound of green cheese, and 9½ lbs. for one pound of cured cheese. The whey was fed to hogs at the factory, which cleared the patrons about one dollar per cow."

Mr. Baker states that his rule is to make cheese for his customers, or "patrons," at a cent and a-half per pound and the whey, or one and three-quarter cents and feed the whey to patrons' hogs—the milk being all brought to the factory.

Mr. Baker writes: "There are several new factories going into operation in this part of the State—three in this county, one in Hilldale county, and, I understand, two in Branch county, near Coldwater. The one in Hilldale county is at Reading. The proprietors are Fowler, Keeney & Co. Their building is 100 feet long, 32 feet wide, and three stories high, of beautiful workmanship and fine material. I venture to say

it is the best constructed building for a cheese factory that has been built in this State.

"If the mania for cheese-factories should increase, and many more be built, we shall have to look outside of Michigan for a market for our cheese."

We called at the West-Fairfield cheese factory, but the proprietor, Mr. Horton, was not at home. We understand that the business of this establishment for the present season, has been about the same as that of Mr. Baker.

#### A BUTTER AND CHEESE FACTORY.

In last year's Report, some notice was given of the combined butter and cheese factories of Orange county, N. Y. In the address of X. A. Willard, Esq., before the American Dairymen's Association, 1866, this matter was brought prominently forward. Mr. W., having spoken of the waste of the butyraceous particles contained in milk, by the ordinary process of cheese making,—remarking that the most palatable cheese is not necessarily that which is richest in butter, and that butter is always worth much more per pound than cheese,—lays down the following propositions:

1. Our cheese is richer in butter than it need be.
2. We cannot retain it all in the curds, even if we would.
3. The price of butter is greatly in excess of cheese.

He then asks: "What do these propositions prove?" And answers: "They prove that we have been annually *throwing away millions of dollars*, without benefiting anybody or anything, except, perhaps, the pigs. It is a waste which all of us have been aware of for a long time; but which in our blindness we were unable to see clearly how to remedy. It can be remedied by the establishment of *butter factories*, in connection with cheese-manufacture. This modification of our system promises to be the leading feature in future operations of the dairy."

Such a factory as is here alluded to, was opened at Ceresco, in this State, by Mr. C. H. White, a few months since. The novelty of the establishment, and the somewhat peculiar man-



agement here observed, will justify a rather minute description. The factory is a frame building, 122x32 feet, and two stories high. The lower story comprises the manufacturing room for cheese, 32x30 feet, the curing-room, 48x32, a store-room, 20x12, the press-room, and rooms for cooling the milk, the making and storing of butter, &c.

When the milk is brought to the factory, it is strained into tin pails about eight inches in diameter and about twenty inches in length. The pails are set in a large vat containing water, which preserves nearly a uniform temperature of forty-six degrees. These pails are in reality the *milk-pans*; the cream rises in them, and is skimmed off when all has risen, from twenty-four to thirty-six hours being the time required. It may, perhaps, be objected to this plan, that the cream does not rise so well as it would if the milk was set in more shallow vessels; but according to the experiments of the Orange county (N. Y.) butter-makers, as much cream and that of better quality, can be obtained on this plan as from shallow pans. They say as little of the surface of the milk as possible should be exposed to the air, and that the surface should be in a moist atmosphere to prevent the top of the cream from getting dry. As soon as the milk is skimmed, the pails are emptied into the cheese-vats, and the process of cheese-making is commenced.

The water for the supply of the vat in which the milk is set, is forced up from a spring several rods from the factory. The same power carries water from the same source to the house and barns. It is kept constantly running through the vat, in which it seldom varies in temperature more than a degree from that at the spring. To be sure of having the temperature of the milk-room and store-room as low as is required in warm weather, a large quantity of ice is stored on the floor above. It is doubtful, however, whether this will be needed, as the lower rooms on two sides, are several feet below the surface of the ground, and the large quantity of cold running water, keeps the temperature quite low. There is always a good circulation

of air through the rooms, but the sun's rays are excluded from them.

The churning is done by steam-power. The churns used are about the size and shape of a barrel. They stand on end, and the cream is worked by upright dashers. Twelve churns can be in operation at once. The butter is worked on an inclined table or platform, by means of a brake or lever, being scarcely touched by the hand. It is salted as soon as it comes from the churn, with a little less than an ounce to the pound of fine Ashton salt. When the salt has been thoroughly worked in, the butter is placed in the store-room and remains there twenty-four hours, when it is worked a second time, and packed in jars or tubs. No water is allowed to come in contact with the butter, either in the process of working or at any other time. It is held by the superintendent that the only advantage of water in connection with butter, is to make that which comes too soft, so hard that it can be properly worked, and they have no such butter here. The conditions in which the milk and cream are kept, and the strict care that is observed in regard to all requisitions, result in the production of butter of nearly uniform quality through the season, and that quality so high that there has been a constant demand for the article at prices above the regular market quotations.

It is proper to say that the butter-making department at this factory, is under the supervision of Miss E. Winfield, and that it presents in all respects a pattern of neatness and systematic management.

The cheese-making is directed by Mr. L. C. Durkee, who, before coming here, had much experience at a similar establishment in New York, and is evidently a skillful and thorough manager. All the fixtures and apparatus are of the most approved kind, in reference to carrying on the operations in the best manner, and with the least expenditure of hand labor. With the exception of the man who attends the engine, only four persons are employed about the factory—two men and

two women. The superintendent of the butter dairy has also the direction of affairs at the farm-house.

One of the first questions, probably, that will arise in the minds of most persons who read this article, will relate to the quality of the cheese made at Mr. White's factory; and on this point we cannot do better than to give the following letter:

To SANFORD HOWARD, *Sec'y of Mich. State Board of Agriculture*:

I received from you a short time since a specimen of skim-milk cheese from the factory of Mr. White, at Ceresco. I was much surprised to find that so good and *toothsome* a cheese could be made from skim-milk. This cheese does not support the standard reputation of skim-milk cheese—"good for cart-wheels." It is as good as the average of country-made cheese, manufactured from whole milk. It is in remarkable contrast to the English skim-milk cheese—the hard and horny cheese of Suffolk, which often requires an axe to cut it, and which is so hard "that pigs grunt at it, dogs bark at it, but neither of them dare bite it."

At your request I analyzed some of Mr. White's skim-milk cheese, and I herewith send you the results. The sample was somewhat dry from keeping, and the proportion of water in the cheese is smaller than it would be if the analysis had been made from a piece recently taken from the cheese loaf:

Water in 100 parts,.....	33.62
Casein " " .....	44.78
Fat, " " .....	17 90
Salts, " " .....	3.70
	<hr/>
	100.00

I append for comparison, analyses of several kinds of English cheese, as reported by Prof. Johnstone, and quoted in *Muspratt's Chemistry applied to Arts and Manufactures*:

	WATER.	CASEIN.	FAT.	SALT.
Skim-Milk Cheese, .....	43.90	45.04	5.98	5.18
Double Gloucester, .....	35.82	37.96	21.97	4.25
Dunlop, .....	33.46	25.87	31.86	3.81
North Wiltz, .....	36.34	31.12	28.06	4.46
North Wiltz, .....	44.80	23.17	23.04	3.99
Cheddar, .....	35.24	23.98	30.40	4.33
White's Skim-Milk, .....	33.62	44.73	17.90	3.70

From this table it will be seen that Mr. White's cheese contains *three times* as much butter as does the English skim-milk cheese. The English "Double Gloucester" is made by adding the *milk and cream* of the evening to the fresh milk of the morning, and from this mixture is made the curd for this favorite cheese. Yet the "Double Gloucester" contains only four per cent. more butter than does Mr. White's skim-milk cheese.

It is a matter of surprise to me that Mr. White can make any considerable quantity of butter, and yet from the skim-milk make cheese of so good a quality as the specimen I received from you.

R. C. KEDZIE,  
*Prof. of Chemistry.*

AGRICULTURAL COLLEGE, Lansing, Jan. 24, 1868.

It may be added that various other persons who have tasted Mr. White's cheese, agree, generally, with the opinion expressed by Dr. Kedzie as to its quality.

Mr. White commenced operations at his factory on the 5th of June last, with forty-five cows, the number being gradually increased to eighty-five. The cows, however came in very irregularly, so that the results of this season are not a fair criterion of what may be expected when all the affairs of the factory are

properly organized. In addition to the milk from his own cows, Mr. W. has purchased some from farmers in the neighborhood. The price paid was a cent and a-half per pound, delivered at the factory.

Memoranda furnished by Mr. White, present the following facts in regard to the quantity of milk received at the factory for each month, from the commencement to the close of the business. They are interesting in several respects, but especially so from showing the quality of the milk,—or the proportionate elements it contained of butter and cheese,—at different periods of the season:

*June.*—Received at the factory from the 5th to the 30th of this month, inclusive, 83,415 lbs. of milk, from which was made 1,800 lbs. of butter—a pound of butter to 46½ lbs. of milk. From the same milk was made 6,422 lbs. of cheese, *green weight*—a pound of cheese to a little less than 13 lbs. of milk.

*July.*—Milk, 127,806 lbs. Butter, 3,337 lbs.—a pound to about 38 lbs. of milk. Cheese, 11,680 lbs.—a pound to about 10 lbs. of milk.

*August.*—Milk, 124,733 lbs. Butter, 3,840 lbs.—a pound to 32½ lbs. of milk. Cheese, 10,100 lbs.—a pound to about 12 lbs. of milk.

*September.*—Milk, 108,548 lbs. Butter, 3,536 lbs.—a pound to about 30 lbs. of milk. Cheese, 8,760 lbs.—a pound to 11½ lbs. of milk.

*October.*—Milk, 76,100 lbs. Butter, 2,539 lbs.—a pound to 29½ lbs. of milk. Cheese, 7,144 lbs.—a pound to about 10½ lbs. of milk.

*November.*—Milk, 42,656 lbs. Butter, 2,266 lbs.—a pound to about 18 lbs. of milk. Cheese, 3,131 lbs.—a pound to about 13 lbs. of milk.

The whole quantity of milk received at the factory during the season was 563,238 lbs. Total quantity of butter made, 17,318 lbs. Total quantity of cheese, 47,237 lbs., green weight, which, deducting one-tenth for shrinkage, would leave 42,514

lbs. of cured cheese. The average price received for butter has been a little rising thirty cents per pound, and the average for cheese, fourteen cents.

#### PROFITS OF CHEESE-MAKING.

The following extract from a report, in the *Utica* (N. Y.) *Herald*, of a discussion by the Herkimer County Farmers' Club, of the question—"What does it cost to make a pound of cheese?"—may be read with advantage by cheese-makers in Michigan, although the circumstances of the two sections are not precisely similar. In Herkimer county, N. Y., for instance, land is considered worth from \$100 to \$150 per acre, and the wages paid to even the commonest laborers are said to range from \$25 to \$30 per month and board. It is probable that a better price has been realized for cheese from Michigan dairies, in proportion to value of land and cost of labor, than has been obtained in New York:

Mr. P. B. Myers, of German Flats, said he had formerly rented his farm on the three-fifths rule. That is, the tenant furnished team and utensils, doing all the work and returning the landlord three-fifths of the cheese, one-half of the butter, one-half of the pork, one-half of the "deacon-skins,"\* and half of the grain and vegetables. If any hay is left over, the landlord pays \$3 per ton for harvesting it. If any hay is to be bought the tenant pays \$3 per ton, and the balance is paid by the landlord. The landlord pays \$3 for every calf raised up to four weeks old and then takes charge of it. The tenant pays half the taxes and is to keep fences and farm in good order.

Mr. M. said he had rented formerly under this system but did not like it. He had recently adopted another rule. The tenant gave him 225 pounds of cheese per cow, guaranteeing the price of cheese the same as the average at the Herkimer factory. He made this matter about price a point, and the tenant could then take his choice of manufacturing at home or

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\*The term "deacon-skins" is understood to mean skins taken from calves that are killed as soon as they are dropped.

sending the milk to the factory. Each party puts on an equal number of hogs to consume the whey, and each has half the pork. The tenant takes all the "deacon-skins," pays all the taxes, and is to raise, if required, fifteen calves each year up to four weeks old for the landlord. The dairy consists of forty-five cows. Mr. Myers makes the following estimates of receipts and expenditures:

**EXPENSES.**

Labor and taxes, .....	\$1,126 00
Interest on land at \$75 per acre, .....	980 00
Interest and depreciation on 45 cows at \$60 each, 10 per cent.,	270 00
Keeping team, .....	150 00
Repairs to buildings and utensils, .....	100 00
Incidentals, .....	50 00
	<hr/>
	\$2,676 00

**RECEIPTS.**

Forty-five cows, averaging 400 lbs. of cheese per cow, 18,000 lbs., which sold at an average of \$14 30 per 100 lbs., .....	\$2,574 00
Loss on the business, .....	<hr/>
	\$102 00

Mr. Myers says there are many expenses not enumerated, while the interest and depreciation on stock is much too low. It will be remarked that nothing is allowed in this estimate for manufacturing cheese, boxing, bandage, &c., which usually amounts to two cents per pound.

Hon. Josiah Shull, of Mohawk, has a farm of 81½ acres, which cost \$130 per acre. He keeps 20 cows. His estimate is as follows, making no account for the farm:

**EXPENSES.**

Boy six months and board, .....	\$180 00
Man, including board, .....	360 00
Fertilizers—plaster, &c., .....	18 00
Taxes, .....	78 00
Horse-shoeing and other repairs of farm implements, .....	50 00
Wear and tear of implements, .....	65 00
Average repairs of fences and buildings, .....	175 00
Average depreciation and interest on stock, .....	180 00
Insurance, .....	4 00

Incidentals, .....	\$50 00
Carting Milk and manufacturing cheese, .....	215 00
	<u>\$1,305 00</u>

## RECEIPTS.

Twenty cows yielding 8,337 pounds of cheese, whole sold for \$14 28 per hundred, .....	\$1,186 33
Increase on stock for beef, .....	40 00
Calves, .....	45 00
	<u>1,271 33</u>
Loss, .....	<u>\$33 67</u>

In this estimate, it will be remarked that nothing is charged for farm, for female labor or for superintendence and work by Mr. Shull and family. All the grain raised on the farm is consumed by them and stock. It will be seen that the cheese costs more than \$14 25 per hundred. The statement was considered by the Club a very fair estimate.

Mr. Eleazer Rice, of Fairfield, one of the best farmers of Herkimer county, as well as one of the most successful—a sound, clear-headed business man, gives the following estimate of profits from a 50-cow dairy. In this case, as in that of Mr. Shull, the farm is thrown in or called nothing:

## RECEIPTS.

Fifty cows, 400 lbs. to the cow, 20,000 lbs. at 14c., .....	\$2,800 00
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## EXPENSES.

Interest on cows at \$70, and utensils, wagons, &c., \$5,000 at 7 per cent., .....	\$350 00
Depreciation of cows and loss from disease, average, ..	350 00
Depreciation on teams, utensils, &c., .....	250 00
Fertilizers, .....	36 00
Taxes on land and personal property, .....	150 00
Horse-shoeing and repairs of tools, &c., .....	50 00
Repairs of buildings, fences, &c., average, .....	150 00
Insurance, .....	8 00
Incidentals, .....	50 00
Paid for hired help, .....	500 00
Board, &c., of hired help, .....	250 00
For making cheese at factory, boxing, &c., .....	400 00
	<u>2,544 00</u>
Profits, .....	<u>\$256 00</u>



In this estimate it will be remembered nothing is charged for personal or family services. Some small items doubtless are sold from the farm to partly balance this labor.

Mr. Shull said that he could present another view of estimating expenses on his farm of 82½ acres, as follows:

Hay, 45 tons for wintering 20 cows, at \$15 per ton,.....	\$675 00
Interest on 20 cows, \$70 each at 7 per cent.,.....	105 00
Expenses in keeping team,.....	150 00
Hired man six months,.....	180 00
Man by the year,.....	300 00
Total expenses,.....	<u>\$1,310 00</u>
Receipts from the farm from all sources as before noted,...	1,271 00
Loss,.....	<u><u>\$39 00</u></u>

Mr. Whitman remarked upon the high prices which land would command in Herkimer county, and especially in the vicinity of Little Falls. He spoke of a farm on Fall Hill, about three miles from the village, with only ordinary buildings, which had just sold for \$140 per acre and not including stock, which was included in a separate purchase. The farm was sold by Mr. Rosecrants, and perhaps was about a fair average as to soil of lands in the vicinity. He said, with the estimates which had been given, he did not see how men could pay for such farms by dairying it out of the land.

#### THE FLAVOR OF CHEESE—HOW AFFECTED INJURIOUSLY.

At the third annual meeting of the American Dairymen's Association, held at Utica, N. Y., Mr. Weeks, the Secretary of the Association, read a paper on the subject indicated by the above heading. He gives a somewhat graphic account of certain unclean practices among the so-called "patrons" of New York cheese-dairies—practices which it is to be hoped have not found, and never will find, their way into Michigan. But however that may be, there can be no harm in bringing them to the notice of our dairymen as a warning; and as the article contains other matters of importance in reference to cheese-manufacture, the greater portion of it is herewith presented:

In offering a few remarks upon this subject, I wish to be understood as entirely disclaiming all attempts to add anything to the fund of knowledge already existing in regard to it. My object is simply to group together a few facts, known to us all, but which we are yet so very prone to forget or to ignore; leaving to other and to abler men the task of going more deeply into the subject of flavor in cheese, and of explaining to us those causes that to most of us are hidden, or at least, only dimly discerned. That there are causes affecting the flavor of cheese which we do not yet understand, I strongly suspect. That the weather, heat and cold, wetness and dryness, have an influence, I fully believe. But *how*, or *why*, or, in all cases *what*, I am unable to tell.

Leaving all these uncertainties of the question, there is a sufficiently large list of causes for badness of flavor in cheese to demand our diligent attention, and speedy remedies. I am aware that it is customary on the part of some of our factory men to persuade themselves, and try to convince others, that the complaint by buyers of "*bad flavor*," "*out of flavor*," &c., is all a fallacy, a story gotten up by the buyer, in order to secure the article under value. With such a feeling I have no sympathy. The first cause of the badness of flavor, which I shall mention is—

1. **Unclean Milk.** No argument is needed to convince any person present of the fact that from dirty milk good cheese cannot be made. But what are we doing to make an improvement in this direction? Here and there an individual cheese-maker may have lifted up his voice for reform; but, generally speaking, we are doing nothing. Indeed, we are doing less than nothing,—for with every season that we neglect to inaugurate an improvement, the thing grows worse, and the reform needed is something more thorough, more radical, than the occasional examination of cans and faucets, or the returning of a mess of milk now and then. I think I do not exaggerate when I say that of the farmers who send milk to our cheese factories, at least 40 per cent. fully believe that

anything that is milk (and some things that are not), is good enough to send to the factory. Believing so or not, they act so, as the contents of our strainers attest. I have oftentimes fancied that a naturalist could scarcely find a more favorable opportunity to secure a rare and curious collection of beetles, and spiders, and flies, and other insects, than by bespeaking the creatures that we fish out of our strainers!—and then the sticks and straws, the leaves, the clay, the dust—all of which are nothing when compared with the nameless horrors that belong only in the barn-yard; and all these after the milk has been strained at home. Am I coloring? Or am I not rather calling to your mind experiences scores and hundreds of times repeated? And then the filthy hands of careless milkers, and the unspeakably nasty habits of some of them in milking, we do not see but the results of such things we do see in the foul-smelling whey, in injured curd, in bad flavored cheese. I know of dairies—and they are considered by no means as unusually objectionable—but rather the contrary, where the family does not pretend to draw milk from the factory-can for household use. They do not consider it, they know that it is not, fit to use. It will be difficult thoroughly to remedy this evil, but it is high time that we, as an association and as individuals, set our faces as flint against this carelessness on the part of those who furnish milk to us. We need not grope our way in the dark feeling after hidden and unknown causes of bad flavor, when we have so prolific and so apparent an one before our eyes. And we may rest assured that we can never secure clean flavored cheese until this wrong is righted.

2. **Diseased Milk.** In many cases cheese-makers are sorely puzzled and troubled with a curd acting strangely and unaccountably, and which, despite their best efforts, only resulting in an almost worthless cheese. The difficulty is caused by unhealthy milk, which some patron has sent in, either accidentally or intentionally. It is not always easy to remedy this evil.

3. **Cows sometimes eat objectionable weeds, and a bad flavor is imparted to the milk, and, as a consequence, to the cheese.**

Especially during severe drought, when pasturing affords insufficient sustenance, they are apt to resort to leaves and shrubs that ordinarily they leave untouched.

4. Cows in being driven from the pasture are too often chased by dogs, or are otherwise over-driven, and the milk is thereby rendered feverish, heated and unnatural. And in the same connection it is pertinent to remark that the practice of scolding and knocking the cows about by incompetent and brutal milkers, is not only an act of cruelty towards these kind and docile animals, and very bad policy, pecuniarily to the dairyman, but it also adds its mite towards the injury of the milk.

5. Failure to remove natural heat from the milk. On this point there is some diversity of opinion, but I confess that I every year become more strongly convinced that cheese made from milk from which the animal warmth has not been removed will invariably be out of flavor. Where cheese is made once daily, the evening's milk is sufficiently cooled. But the morning's milk is not. Take an instance of this kind. Here is a dairy of thirty cows situated two miles from the factory. By six or half-past six o'clock, at the latest, of a July morning, the cows are milked and sent into the pasture. The milk is strained into the can or cans standing upon their usual block, and the cover has been carefully put over it. They keep out some dust and leaves, and also keep in the animal heat and any bad odors arising from foul milking, a portion of which might escape if the air had free access to the milk. The morning is hot and sultry, and the sun has long since hinted that the day will be fiery. Meantime the milk-team, which began to gather its load a mile or two back, comes tardily along, and by 8 o'clock, after standing in the hot sunshine nearly two hours, our can sets out on its pilgrimage to the factory. Frequent halts are made to put other cans upon the wagon, so that nine o'clock comes before this milk can be poured into the vats. Place your hand upon the cans at such a time and you will find them uncomfortably warm—even hot. Now here we have a large body of milk, the natural temperature of which is 90°, which has

been closely confined in the can since the milking was completed, and which has been three hours exposed to the rays of the burning sun. Now what do we do with this milk? Do we carefully strain it and reduce its temperature to 60°, or thereabouts? Not at all. At best we run it into a vat of night's milk which may stand at 55°. Filling this vat from our load of heated milk, the mass will be found to stand at 72° to 75° temperature. This is too warm, but good cheese may result from it. But our heated milk rarely can be put directly into cool milk. It is a hurrying season of the year—the vats are almost overflowed with milk—the weather is warm, and things must be driven or we shall have sour cheese. Therefore the heat is applied to a vat which contains as yet nothing but night's milk, but is about to be filled. As milk is added the temperature of the morning's milk, aided by the heat now being applied, is constantly increasing the warmth of the entire mass, so that when our load of heated milk is ready to be poured in, the milk already in the vat stands at 70° to 75°. The natural heat of our load will raise the temperature of the filled vat to 80° or 84°, and, behold, the time to apply the coloring and the rennet has fully come, and no delay occurs in any part of the process, for presently our curd has "come," it is cooked and is ready for the press.

Now, fellow cheese-makers, what kind of cheese will this develop into after standing upon our ranges through one or two hot summer months? And do not such cases, in greater or less degree, occur daily in nearly all our factories? If, then, we are agreed that the effects of making cheese from heated milk are pernicious, let us set about discovering and applying the remedies. I have none to suggest that are at all sufficient. One has been mentioned to me by Mr. Greene, of Rome, which, if feasible, would help us greatly. Let each farmer provide himself with a shallow tank of tin—large or small, as the size of the dairy requires. This to be floated upon water, with which our dairy farms are usually supplied. Into this tank the milk would be strained, and a dipper used to assist the water

in removing the animal heat; and here the milk might be kept until the team is ready to start for the factory. Then, too, some temporary awning or protection from the sun's rays, while the cans of milk are on the road, might easily be resorted to on warm mornings. It is also well to adopt a rule at the factory to continue the current of cold water around the vat of milk up to the time that it is filled, and never to apply the heat until all the milk is in the vat that is to be put in. My own views on this matter received strong confirmation during a visit to some of the factories in Canada, in October. There the fact that good water is an essential point to insure a successful cheese-factory, has been largely overlooked. Consequently cheese is made twice daily. Of course, neither the evening's nor the morning's milk is properly cooled, and as a result, their cheese, generally speaking, was much out of flavor. I know of similar experiences on this side of the line.

6. Impure annatto. In considering the causes which induce bad flavor in cheese, we sometimes are apt to place little thought upon the influence which impure coloring has upon it. The list of articles used in the adulteration of annatto is surely sufficiently formidable to account for the badness of many a cheese that, except in flavor, may be unexceptionable. And such is now the large demand for annatto, and so little of the strictly pure and good is brought to our ports, that very many of our factories are compelled to use second and third qualities, which, I suppose, are never pure.

7. Bad rennets. Here again no argument is needed to convince you of the fact that immense mischief is yearly done in the use of poor and tainted rennets by our cheese-makers. In their very best state, rennets are not suggestive of attar of roses for sweetness, nor of white lillies for purity. A substitute for rennet, that shall be cleanly and of uniform strength, is what we most need in cheese-making.

It is appalling and sickening to think of the numbers and the fearful condition of immense quantities of rennets that are sent out by our city butchers and used in our cheese-factories.

The wonder is that we make any cheese that is good in flavor. Again, we find many of our factories still unprovided with rennet-jars; they persist in using wooden vessels, and in these, after long service and in warm weather, even good rennets will taint, especially when prepared in water.

8. Curds insufficiently cooked, in our warm climate, will almost invariably lose their sweet flavor.

9. Curds too lightly salted are not only sure to be objectionable, as regards porosity, but are equally sure to be out of flavor.

10. Salting curd while yet too warm and too damp; and

11. Putting curds into the hoops and to press before they are properly cooled.

These two are among the most prolific causes of bad flavor in American factory cheese. I will not, however, detain you by enlarging upon this point. Happily these two sources of trouble, are of all those mentioned, the most easily remedied.

12. Exposure of cheese to too high a temperature while curing. Our dry-houses are not rightly constructed. In summer they are far too warm, in spring and fall they are as much too cool. A cheese that is rightly made, is pure in flavor, and indeed quite perfect in all respects, will receive injury if exposed to the summer temperature of the upper rooms of our curing houses. What then will result to cheese made from unclean milk, from diseased milk, from milk from which the natural heat has never been removed, from milk poisoned by adulterated annatto, or by tainted rennets, from curds not fully cooked, from curds saturated with whey when put into the hoop, from curds insufficiently cooled before salting and pressing? There are other things which induce bad flavor: foul cans and milking utensils, tainted pails and unclean surroundings to the factory. These have their influence, and a most baleful influence it is too.

## CROSS-BREEDING OF SHEEP.

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[In my Report for 1865, an article on the "Cross-breeding of Horses," by W. C. Spooner, was published. In that article Mr. Spooner alluded to one previously written by him, and published in the Journal of the Royal Agricultural Society, on the "Cross-breeding of Sheep." Believing that this article may be read with advantage by the farmers of Michigan, it is herewith appended:]

It cannot be denied that the natural laws by which the preservation of animal species is effected are involved in considerable mystery, and though the subject is well worthy the attention and study of the practical man as well as of the physiologist, experience is yet fraught with so much contrariety that attempts to lay down any certain guide on it have for the most part been received with considerable distrust. No sooner does the inquirer imagine that he has discovered some particular principle which obtains universally, than he is met by circumstances which apparently upset his previous conclusions. The maxim "*like begets like*," for example, is a rule having very extensive sway, yet, as propagation is the work of two parents, the respective influences of the one or the other is a matter involving considerable diversity of opinion, and prevents anything like a certain conclusion being arrived at. We cannot do better than consider, on the very threshold of our subject, the respective influence of either parent; for on this the merits of pure or cross-breeding must principally depend.



The most probable supposition is, that propagation is done by halves, each parent giving to the offspring the shape of one-half of the body. Thus the back, loins, hind-quarters, general shape, skin, and size, follow one parent; and the fore-quarters, head, vital and nervous system, the other; and we may go so far as to add, that the former in a great majority of cases go with the male parent, and the latter with the female. A corroboration of this fact is found in the common system of putting an ordinary mare to a thorough-bred horse; not only does the head of the offspring resemble the dam, but the fore-legs likewise, and thus it is fortunately the case that the too frequently faulty and tottering legs of the sire are not reproduced in the foal, whilst the full thighs and hind-quarters which belong to the blood-horse are generally given to the offspring. There is, however, a minority of cases in which the opposite result obtains. That size is governed more by the male parent, there is no great difficulty in showing; familiar examples may be found in the offspring of the pony-mare and the full-sized horse, which considerably exceed the dam in size. Again, in the first cross between the small indigenous ewe and the large ram of another improved breed—the offspring is found to approach in size and shape very much to the ram. The mule offspring of the mare also very much resembles both in size and appearance its donkey sire.

These are familiar examples of the preponderating influence of the male parent, so far as the external form is considered. To show, however, that size and height do not invariably follow the male, we need go no further for illustration than the human subject. How often do we find that in the by no means infrequent case of the union of a tall man with a short woman, the result in some instances is that all the children are tall and in others all short, or sometimes that some of the family are short and others tall. Within our own knowledge, in one case, where the father was tall and the mother short, the children, six in number, are all tall. In another instance, the father being short and the mother tall, the children, seven in number,

are all of lofty stature. In a third instance, the mother being tall and the father short, the greater portion of the family are short. Such facts as these are sufficient to prove that height or growth does not exclusively follow either the one parent or the other. Although this is the case, it is also a striking fact that the union of tall and short parents rarely, if ever, produces offspring of a medium size—midway, as it were, between the two parents. Thus in the breeding of animals, if the object be to modify certain defects, by using a male or female in which such defects may not exist, we cannot produce this desired alteration; or rather, it cannot be equally produced in all the offspring, but can only be attained by weeding out those in whom the objectionable points are repeated. We are, however, of opinion that, in the majority of instances, the height in the human subject, and the size and *contour* in animals, is influenced *much more by the male* than the female parent; and, on the other hand, that the constitution, the chest, and vital organs, and the forehead generally, more frequently follow the female.

We have dwelt on this point the more because on it hinges the difficulty of effecting certain improvements in breeding by means of crossing, and the still greater difficulty of establishing a new breed by such means. So great is this difficulty that many breeders, finding their attempts at such improvements so frequently baffled, or observing this to be the case in the practice of others, cling with superstitious tenacity to the doctrine of *purity of blood*, believing it to be the *Ark* in which alone true safety is to be found.

Now, *pure breeding*, which, when carried to an excess, is called in-and-in breeding, has its advantages as well as its disadvantages. Its friends observe with great force, that when we have in breeding reached great excellence, it is folly to risk the loss of such excellence by means of crossing; and the more so as the defects of a parent may disappear in a first or second, and re-appear in the third or fourth generation; "*breeding back*," as it is commonly termed. A friend of the writer's, Mr. John Clark,

of Lockerly, a strenuous advocate of pure breeding, observes that a correspondent in Suffolk informs him, that he had seen the cross tried between the old Norfolk and Down sheep, and the first cross was admirable, but they soon became disproportioned and unsightly; also the Down and Leicester in some midland counties figured for a time, and then for the same reasons were given up, and such he thinks will be the fate of the New Oxfords, or the mixture of the Cotswold and the Down. He adds, that for the last four years he has used rams from the cross with Down ewes, and the offspring answered his purpose for *fattening* lambs, but one lamb in ten presents unmistakable evidence of its mongrel origin.

Again, it is urged that great excellences can only be perpetuated by union with similar excellences, and beyond all this that there is a certain amount of advantage from an unstained lineage—from the very possession of breed, as it is designated. The objectors to *in-and-in* breeding urge, that by so doing we engender weakness of constitution, diminution of size, hereditary diseases, and also a tendency to barrenness; but it is argued in reply to such objections, that they occur from want of sufficient care in weeding out defective animals, whether as respects constitution or size. It is a well-established fact, that in the human subject too close affinity, such as the intermarriage of cousins, tends to mental diseases and consumption; and we can readily imagine that when there is a tendency to such diseases in a family, this tendency must be greatly increased by intermarrying with a member of the same family. Animals not being subject to mental diseases, the observation does not apply to them with the same force, but it is true in a lesser degree. At the same time, unless the choice is extremely confined, most of the evils of pure breeding can be avoided by careful selection and vigorous weeding. Examples of pure breeding are familiar to us in the admired race-horse, the first-class Short-horn, and the South Down sheep; but so far as purity of breed alone is considered, the mountain sheep of Wales, the highland Scotch cattle, and the Shetland or Welch, are

equally pure; but whilst the latter have been propagated without care or attention, the former have by careful selection and vigorous weeding, been considerably enhanced in value. A striking example of long-continued pure-breeding is afforded by the Leicester flock of Mr. Valentine Barford, of Foscote near Towcester, who has the pedigrees of his sheep from the days of Bakewell in 1783 to the present time, and since 1810 he has bred entirely from his own flock, sire and dam, without an interchange of male or female from any other flock. He observes, "that his flock being bred from the nearest affinities—commonly called in-and-in breeding—has not experienced any of the ill effects ascribed to the practice." His flock is remarkably healthy, and his rams successful, but his sheep are small.

Let us pause for a few minutes to consider what constitutes *breed*, or rather what is meant by high breeding. We shall find that it refers to very different desiderata in different breeds. In the thorough-bred horse it signifies a very high development of the muscular and nervous systems, accompanied by such mechanical structure as when united with it constitutes the highest manifestation of speed and endurance. In the ox, however, it implies very different qualities, viz: early and rapid growth—the development of flesh or muscle on the parts most prized for food—a disposition to lay on fat; these, with the possession of the smallest amount of bone consistent with strength and health, are the principal characteristics of a well-bred animal. Instead of the highly-nervous temperament of the race-horse, we have here a quiet, lazy disposition; in fact, a lymphatic temperament, by the influence of which the digestive organs reign supreme, and convert for the public benefit a given quantity of food into the utmost amount of flesh and fat. The same observations apply with equal force to the sheep, and in a still stronger degree to the hog. A well-bred pig is the incarnation of everything indolent and lethargic, and the very antipodes of that high organization and nervous development which belong to a high-bred horse. Examples of pure breeding are probably

to be found in greater perfection in cattle than in sheep. The *Devon* and *Hereford* cattle have descended through many generations in unbroken lines, and owe the perfection which they have attained to careful selection. The *Short-horns*, although considerably more modern in their origin, and moulded into their present form by a series of successful crosses, have yet been preserved pure with even more rigorous care than the other breeds which we have mentioned. The solid frame and great feeding properties of the *Herefords*—the quality of beef and richness of cream, as well as working properties of the *Devons*, are well known and generally appreciated; and yet these qualities are insufficient to resist successfully the encroachments of the *Short-horns*, whose early maturity and disposition to lay on both flesh and fat, joined with fair milking properties, are such that they outnumber both the other breeds combined. As, however, the leading purpose for which a breed of cattle is kept is generally well defined, whether for the purpose of the dairy, or for that and early fattening, or simply for beef or for working as well, and, as each of these purposes can be well attained by keeping a pure breed, there is not the same temptation or inducement to cross, which is often experienced in sheep farming, in order to insure specific advantages which cannot otherwise be attained.

This being the case, we may most advantageously devote our remaining space to the practice of crossing, as illustrated in sheep-breeding. We may start, then, with this principle, that to cross for crossing sake is decidedly *wrong*; that, unless some specific purpose is sought for by crossing, it is far better to cultivate a pure breed. The country is, indeed, under great obligations to those gentlemen who carefully preserve their breed intact, and endeavor to improve it by weeding and selection. We can readily excuse their prejudices, if they have any, and have no wish to interfere with their creed. Let theirs be the office to preserve our fountains pure and undefiled, and to supply others with the best sources of improvement by crossing. And we do not confine our praise to those merely who, keeping

in the high road of fashion, have succeeded in securing, both by prizes and prices, a full and sufficient reward for their labors, but would award it to those also who, keeping perhaps in the second rank, have yet supplied their neighbors and the public with valuable pure-bred sheep at moderate prices.

History fails to supply us with the origin of our various breeds of sheep; but we doubt not that, for many centuries after the time of the Romans in this country, certain distinct breeds were perpetuated, with little improvement and little change. The progenitors of the present South Down or Sussex breed, inferior as they were to their descendants, ranged probably, in the days of the Romans, over the South Down hills; whilst another breed, now happily extinct, occupied for the most part the hills and downs of Wiltshire and Hampshire. A large, bony, narrow, but active sheep, with large head, Roman nose, and long curly horns, high in the withers and sharp in the spine, but yet the largest short-wooled breed in existence, were the denizens of these counties during the last century.

In Wiltshire, although they remained as a pure breed much longer than in Hampshire, yet, as far as can be learnt, they were supplanted by the South Down, whose superior qualities displaced the old Wiltshire altogether; and we are not aware of any instances in which they were crossed, except for the purpose of crossing them out by using again and again the Sussex ram. Mr. James Rawlence, of Bulbridge, near Wilton, whose large practical experience both as sheep-breeder and land-agent, stamps his authority with considerable weight, observes in reply to the author's inquiry: "The last flock of this breed (old Wiltshire) disappeared about the year 1819, and the substitution of the South Down commenced late in the last century. In many cases South Down ewes as well as rams were brought out of Sussex to replace the horned flocks, but in numerous instances the two breeds of sheep were crossed, and by the continued use of the South Down ram, the chief characteristics of the horned breed were merged in the Downs. The cause of

the very rapid substitution of the Down for the Old Wiltshire, may be found in the fact of the large number of enclosures of common fields which then took place. The sturdy-horned wether was thoroughly competent to take care of himself when the system of feeding in common prevailed, but when each farmer could keep his flock separate, an animal of superior quality was preferred."

In Hampshire, on the other hand, where the same sheep prevailed and were valued for their hardihood, and their powers of traveling far, and folding hard—properties so valuable when the fertility of the light soils was mainly kept up by these useful manure-carriers—these sheep were extensively crossed. Previous to the close of the last century, the South Down sheep had been greatly improved by careful selection, and the name of the late Mr. Ellman was well known for his eminent services in bringing out and improving the latent qualities of this valuable breed. About the beginning of the present century the sheep-breeders of North Hampshire began to bestir themselves, and a few enterprising farmers procured some rams from Sussex, of the South Down breed. Finding the experiment successful, it was repeated again and again, care being taken to select the largest, coarsest and *blackest-faced* rams, which it was thought would suit the coarse sheep with which they had to amalgamate. How many crosses with the pure Sussex were used we cannot ascertain, but enough materially to alter the character of the breed, to cause the horns to disappear, and to change the color of the face from white to black; and with these changes, to impart a more compact frame, a broader back, rounder barrel, shorter legs, and superior quality altogether, and yet preserving the hardiness and the disposition to make early growth, which the original flock no doubt possessed, and with it the large heads and Roman noses, which form so distinguishing a characteristic of the Hampshire Downs, and which are unquestionably derived from the original breed. Indeed, it is only necessary to inspect a drawing of the original Hampshire or Wiltshire sheep, to become thoroughly satisfied

as to the source from whence it derived the colossal head which some fifteen years since was regarded as, I will not say an ornament, but an indispensable appendage of the breed. Uniformity of color is also a great point with most Hampshire breeders, with what amount of advantage we cannot say, but black tips to the ears as well as black faces are deemed essential, and any crossing with speckled-faced sheep, such as the Shropshire, is in consequence viewed with dislike.

It was not until the Wiltshire sheep-breeders began to produce some large but more symmetrical animals, that the Hampshire men began to consider whether it was not possible to reduce the size of the heads, without losing the characteristics of the breed. By attention and careful selection this has been accomplished, and we have now a breed of sheep which is admirably adapted to the present system of fattening off at much earlier ages than formerly, and, for the most part, as tegs and two-teeth sheep. It is certainly not owing to any aristocratic patronage that the Hampshire sheep have forced their way into public estimation. They have neither been upheld by agricultural societies or agricultural writers, nor have they been launched into public favor as winners of prizes; on the contrary, they have been laughed at, criticised, and condemned; and yet they have not only held their own, but have spread far and near, so that the county in South England where none are to be found, is probably the exception and not the rule. The Hampshire sheep may, therefore, be instanced as an example of successful crossing, and as a proof of what can be done by the male parent, in changing, in very few generations, the character of the original, and yet retaining some of its good qualities, thus forming a breed more intrinsically valuable than either source from whence it is derived. It has been truly said that the public is wise though composed of fools; and undoubtedly, when the pocket is concerned, the decision of the public is, for the most part, correct. Thus at the various autumnal fairs large lambs are in the greatest request, and command the highest prices, which in itself is sufficient proof that with a given



amount of food they make a greater quantity of mutton. It was found, indeed, by Mr. Lawes, in his careful and valuable experiments, that the Hampshire sheep, although they were surpassed by the Cotswold, yet exceeded the South Down in the amount of mutton raised from a given weight of food. The greater economy of fattening a young over an old animal may be readily explained by the fact, that whilst the latter increases in fat alone, the former does so both in flesh, fat and bone, and thus the latter can assimilate a greater amount of the nutritious properties of the food, and is consequently a more profitable feeder.

We have no reason to suppose that after a few generations the Hampshire breeders continued to use the Sussex rams; as soon as the horns were gone, to which, perhaps, the Berkshire Notts contributed, and the face had become black, they employed their own cross-bred rams with the cross-bred ewes. If, then, we were asked what original blood predominated in the Hampshire sheep, we would unquestionably say the Sussex; but if the further question were put: Is the present breed derived from the Sussex and the original Hampshire alone? we should express a doubt as to such a conclusion, as there is good reason to consider that some improved Cotswold blood has been infused. Some thirty years since a Hampshire farmer still living (Mr. John Twynam) used the improved Cotswold ram with his Hampshire ewes, and the first cross exhibited a remarkable proof of the preponderating effect of the male. The produce, in size, general appearance, and wool, partook far more of the ram than of the ewe, and it was thought that a most valuable breed had been obtained, which, with the increased size, and weight of fleece, and disposition to fatten of the Cotswold, would combine the hardiness and folding capabilities of the Hampshire. It was found, however, no easy task to perpetuate such a breed after the first cross—the defects of the one parent or the other would appear and re-appear in the second and third generation, and it was only by careful weeding that anything like uniformity could be attained. Mr. E. G. Young,

of Broadchalk, Wilts, a close observer as well as an excellent farmer, informs the writer that he, as well as his brother, purchased Mr. Twynam's rams for several years, and has, he conceives, derived advantage from the cross. Mr. Rawlence observes, that the points he has arrived at have been to produce an animal yielding at an early age the largest possible amount of mutton and wool, which he considers the *sine qua non* of sheep breeding; and he adds, it is difficult to estimate the enormously increased production which has within the last few years been obtained by keeping this object steadily in view. Whilst he highly appreciates the high-bred South Down, he is convinced that the present system of farming demands a larger description of sheep, and one which will produce a heavy weight of wool at an earlier age, and he is not quite sure whether a cross with the Cotswold would not produce a more profitable animal. The absurd fashion of drafting good sheep, if they have not black faces and ears, tends to retard the improvement of the carcass. After some few years a change of farm and other causes led to a discontinuance of the experiment, yet many of the cross-bred rams were sold and let to sheep-breeders both in Hampshire and Wiltshire; and although after dipping once or twice into this breed they then ceased to do so, yet they have continued breeding from descendants of the cross, and thus, in very many of the Hampshire and the Wiltshire flocks, there is still some improved Cotswold, and, consequently, Leicester blood.\* Probably an increase of wool has thus been obtained. Some say that on the borders of Berkshire the Berkshire Nott was also used, and others contend, although without proof, that a dip of the Leicester has been infused. Be this as it may, there is no doubt that, although for some years past the Hampshire sheep have, for the most

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\*It is, we believe, generally acknowledged that the Cotswold sheep have been improved by crosses from the Leicester ram; and although the origin of the latter is involved in some obscurity, yet it is generally supposed that Bakewell, the founder, whilst he used the original Leicester or the long-wooled breed, which prevailed mostly in the midland counties, as his foundation, crossed them with various other breeds until he succeeded in establishing the superiority of excellence which he afterwards sought to maintain by pure exclusive breeding.

part, been kept pure, yet they have been very extensively crossed with other breeds before this period.

We cannot do better than let Mr. Twynam speak for himself on a matter on which he has bestowed considerable attention during a period of ten or twelve years. In a paper he has recently read before a Farmers' Club—after some observations on the respective merits of the Cotswold, the Leicester, the South Down, and the Old Wiltshire, or Hampshire, from all which sources the present breed is derived—he states his idea was to blend these various breeds together, which he did by using the improved Cotswold ram (Cotswold and Leicester) with the Hampshire Down ewe. As a proof of the value of the cross, he observes,—“I have the written documents of the feeder of one hundred tegs sold in 1836, the wool and carcasses from which returned 400*l*.” By using this cross an earlier maturity is gained than by either breed separately. He observes:—“The Leicester and Cotswold will become large, heavy and fat on the outside, but not inwardly, as yearlings; very few Downs will at that age be sufficiently advanced for slaughtering, from their known disposition to arrive more slowly at maturity.” What, then, is wanted is young sheep, large, heavy, and well furnished at a year or fourteen months old, and this object is attained by the cross, as the testimony of the butchers who bought the sheep will show. He continues,—

“You must have observed an immense improvement in the character of the Hampshire sheep generally within the last fifteen or twenty years—an increase of size, a heavier fleece of a longer staple, with a kindlier touch, evidencing a greater aptitude to fatten. I have had my attention called to this fact frequently since I have ceased to be a breeder. How has this altered character been obtained? Can we recognize none of the Cotswold fleece or his more symmetrical proportions? And, when I tell you that, in the years 1835–36 and subsequent years I sold very many half-bred rams, not only into Hampshire Down flocks generally, but into those of six or eight of our first ram-breeders whose names are at this day to be seen

upon my books; when you must be aware that these breeders are in the constant annual habit of selling one to another in this and adjoining counties; I trust I may without presumption, lay some little claim to having supplied a portion of the material from which our present flockmasters have worked up a better and more valuable fabric."

It is a curious fact that, whilst the system we have detailed has been followed in Hampshire, a very different plan has been adopted in the neighboring county of Wiltshire. Here the same large, flat-sided, uncouth horned sheep, whose ancestors were its denizens in the days of the Romans, ranged over the Wiltshire Downs, and, indeed, retained possession some years later than in Hampshire. They at length succumbed to the superior qualifications of the Sussex Downs which gradually displaced them, not by crossing them out so much as by being substituted in their place, and thus the imported Sussex became the West-Country Down. At length a larger sheep and particularly a larger lamb was demanded, and then the Wiltshire breeders procured rams from Hampshire and greatly improved their flocks in size, and secured larger lambs. Beginning with Sussex ewes, they have increased the size of the frame without materially enlarging the heads, and thus a very valuable breed of sheep has been formed, the Wiltshire Down, whose more perfect symmetry frequently enables their owners to wrest the prize from the Hampshire men, and to cause the latter, by the rivalry thus induced, to improve the symmetry of their sheep by careful selection. The Wiltshire Down breeders, therefore, began with the Sussex ewe, and crossed with the Hampshire ram, whilst the Hampshire breeders used the original horned ewe and the Sussex ram. The latter, therefore, have less of the South Down than the former, and, though of greater size and producing somewhat larger lambs, have less symmetry.

Mr. Rawlance, whom we have before quoted, informs the writer:

"The original flock from which my present sheep are chiefly descended, was of the Sussex breed and of moderate quality.

I commenced by drafting all the small and delicate ewes, and the remainder were crossed with rams of the Hampshire breed. I bred from their produce for two or three years, and then had another cross with the Hampshire, still continuing to cull defective ewes. After I had obtained considerable size from the infusion of the Hampshire blood, I had recourse to some rams bred by Mr. Humphrey, of Chaddleworth, Berks, which were the produce of the biggest and strongest Hampshire ewes by a sheep of Mr. Jonas Webb's. I use my own rams, and I also frequently purchase a few of the best Hampshire ewes I can get, put my own sheep to them and use their lambs. I also put a sheep of Mr. Humphrey's to some of the best of my ewes, and select rams from their produce, thus getting fresh blood without making an entire cross."

Our account of the Hampshire sheep would be by no means complete, unless we notice the sheep of Mr. William Humphrey, of Ash Oak, near Wantage, Berks, specimens from whose flock have so frequently been prize-winners, and their services generally acknowledged by other improvers.

Mr. Humphrey, in a communication to the writer, has furnished the following interesting history of his sheep, which shows that, although they may be correctly designated the Improved Hampshire Downs, they are yet *sui generis* and distinct from any others, and may be considered peculiarly his own:

"About twenty-five years since, in forming my flock, I purchased the best Hampshire or West-Country Down ewes I could meet with; some of them I obtained from the late Mr. G. Budd, Mr. William Pain, Mr. Digweed, and other eminent breeders, giving 40s. when ordinary ewes were making 33s. to 34s., using the best rams I could get of the same kind until the Oxford show of the Royal Agricultural Society. On examining the different breeds exhibited there, I found the Cotswolds were beautiful in form and of great size; and, on making inquiries as to how they were brought to such perfection, I was informed that a Leicester ram was coupled to some of the largest Cotswold ewes, and the most robust of the produce were selected

for use. The thought then struck me that my best plan would be to obtain a first-rate Sussex Down sheep to put to my larger Hampshire Down ewe, both being of the short-wooled breed. I thus determined to try and improve the quality and form of my sheep, still retaining the size and hardihood so necessary for our dirty low lands and cold exposed hills. With this object I wrote to Mr. Jonas Webb to send me one of his best sheep, and he sent me a shearling by his favorite sheep Babraham, which made some good stock out of my large ewes. I went down the next two years, and selected for myself; but the stock did not suit my taste as well as the one he sent me, and I did not use them. I then commissioned him to send me his sheep which obtained the first prize at Liverpool; and from these two sheep, the first and the last, by marking the lambs of each tribe as they fall, then coupling them together at the third and fourth generation, my present flock was made. Not having used any other blood on the male side for more than twenty years, I found some difficulty at first, when putting the first-produce ram to the first-produce ewe, the lambs coming too small to suit my customers. To obviate this difficulty I drafted out the finest and smallest-bred ewes, replacing them with the largest Hampshire Down ewes I could meet with that suited my fancy; still continuing to use the most masculine and robust of my rams to keep up my size. Some of my friends advised me to use a large coarse sheep to these small ewes to remedy the defect; but the larger ewe seemed to me the better way, and that course I pursued. I got rid of my smallest ewes, and replaced them with large ones, which gave me what I thought to be an advantage—the using no male animal but of my own blood, the pedigree of which I am now acquainted with for more than twenty years. It has succeeded hitherto beyond what I could have expected. My object has been to produce a Down sheep of large size with good quality of flesh, and possessing sufficient strength and hardiness to retain its condition while exposed in rough and bad weather to consume the root crops on our cold, dirty hills. Independently of the value of

the Hampshire or West-Country Downs in an agricultural point of view for such localities as ours, they produce when slaughtered, a valuable carcass of mutton, giving the consumer a good proportion of flesh to the fat, which is a point that may be too much lost sight of. I will, in proof of it, relate an instance which a gentleman told me the other day. When residing in another county he sent to his butcher for 3 lbs. of mutton. The fat seemed so much out of proportion to the lean, that he had the curiosity to weigh the lean. After carefully cutting it out, he found it to weigh  $\frac{3}{4}$  lb., or only one-fourth of the whole. This anecdote indicates to those who are attempting by crosses to establish a new breed, or to improve an old one, the importance of producing an animal in which the flesh forms a due and sufficient proportion of the whole."

In Dorsetshire the same system has been pursued as in Wiltshire, although more recently and to much less extent.

In the eastern part of the county the Wiltshire system of crossing has been followed with still greater latitude. The object being to secure size without coarseness, the rams of the Hampshire as well as the Sussex are each used, as the fancy of the breeder may direct. In one flock, well known to the writer, of good repute—so much so, that an annual sale of rams and ram lambs takes place, and for several years past has been very successful—the owner whose flock was originally South Down, has increased the size of his sheep by means of the Hampshire ram, but does not hesitate to avail himself of the Sussex from time to time to counteract as he says, any tendency to sourness, and also uses the choicest of his own breed as well. Here is an evident cross, carried to a considerable extent and with great success, as the high price realized by the sale of fat tegs sufficiently testifies. Other breeders in this county adhere firmly to the South Down, which they seek to improve by using first-class rams; and the superior quality of their fleece, as compared with the Hampshire, forms no small part of their motives for so doing. Some years since the South Down sheep in Dorsetshire received a cross from

the Devon or Bampton Nott, a large long-wooled sheep, but with a good disposition to fatten. The cross was approved of, and the produce were used by other flock-masters, which circumstance has perhaps rendered the Dorsetshire South Down somewhat larger than the Sussex.

The *Dorset horned sheep*, so valuable for their early lambs, some fifty or sixty years since reigned supreme over the Dorsetshire Downs. They were then in many instances supplanted by the *Sussex*, which were found better suited for folding, and were more esteemed for their mutton. Crossing was tried in many instances, but although the half-bred lamb from the Dorset ewe was and still is in great request for early lamb, yet the breeds did not assimilate well; they were, as a flock, inferior to their parents, and were consequently discontinued; and whilst the Dorset held their own in the west, the South Down took their place in the eastern part of the county, and of late years have, in many instances, been crossed by the Hampshire ram.

The Dorset horned sheep is, however, a much superior animal to the old Wiltshire and Hampshire. Shorter on the legs, with a more compact frame and a rounder barrel, this sheep, besides its peculiar value for the production of early lamb and its remarkably prolific qualities, is by no means to be despised for its feeding properties. It is not unusual for these sheep—as well as the kindred though somewhat larger *Somersetshire*—to be brought into market in March and April, together with their lambs and sometimes pairs of lambs, all fit for the butcher at the same time. The Dorsetshire and *Somersetshire* sheep are raised on tolerably good land, where they have been preserved pure and improved by selection.\* It is usual, however, to put the ewes that are intended to be sold to the South Down ram, which improves the quality and fattening predisposition of the lamb, and the ewes are usually sold at the Hampshire October fairs, by which time they are very forward

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\* The Dorsetshire flocks have of late years been crossed and improved by the larger *Somerset*, so that pure flocks of the former are now rare, and the distinction of the two breeds by the color of the nose has almost disappeared.



in lamb. The buyers of the ewes, although the usual custom is to sell off the ewe and lamb the following spring, sometimes keep a portion of the ewes another year, putting them again to a black-faced ram. It is remarkable that these ewes are not only exceedingly prolific and rarely have any mishap in yearning their lambs, but will carry on all the functions of maternity whilst almost fat themselves. In South Hampshire, which is celebrated for the excellent quality of its early lamb, this system is carried out to perfection, particularly with the Somersetshire ewe. The drawback to this breed of sheep, as compared with the Hampshire and South Down, is the longer period required for their maturity, the richer food required, and the somewhat inferior character both of the mutton and the wool.

To return, however, to our proper subject, we may observe that various attempts were made some years since, to introduce the Merino blood, with the idea that great benefit would be derived from the increased quantity and the superior fineness of the wool; and undoubtedly, if the carcass of the South Down and the wool of the Merino could be united in the same animal, the acmé of sheep-breeding would be attained. It was found, however, that the quality of the wool was not a sufficient recompense for the want of early maturity and feeding properties; and at length, after many trials, the Merinos disappeared by the continued use of other rams. It is very possible, however, that they have left behind them some improvement of the fleece, for it is equally difficult in breeding to get rid of a virtue and to wash out a stain. We have confined our examples of cross-breeding pretty much to the breeds of our own locality, but it must not be forgotten that other counties have also some noble specimens of cross-bred sheep. Shropshire is celebrated for its breed of sheep, and under the new regulations they compete very successfully at our annual shows. At the Chester meeting they beat the Hampshire Down as old sheep, but in their turn were conquered by the latter in the younger classes. They present themselves to our notice in a

more compact form; though shorter, they are wider, broader on the back and deeper through the heart.

This breed was first brought into national repute at the Shrewsbury meeting in 1845, when it was wisely held that it was no longer desirable to confine the honors of the Society to a few particular breeds. The new class "Short-wools not South Downs," brought into competition with each other, the Hampshire, the Shropshire, and the West-Country Down or Wiltshire; and thus, although the labors of the judges were rendered somewhat onerous, yet much good was effected, and the public have greatly appreciated and promoted the various breeds so brought into notice.

The Shropshire originally sprang from a breed called the Morfe Common sheep, and owe most of their great and improved qualities to careful selection. We imagine they would make a very good cross with the Hampshire Down, and might somewhat improve the carcass of the latter, as well as the quantity and quality of wool in the flocks of those breeders who do not attach too much importance to the color of the face.

The Shropshire speckled-faced sheep is undoubtedly a cross-bred animal, and indeed affords a striking example of the perfection that can be derived by a judicious mixture of various breeds. At a late meeting of a Farmers' Club in this county, Mr. J. Meire observed: "It is not attempted to be denied that the Shropshire is a cross-bred sheep; the original breed was horned, and the first attempt at improvement was to get rid of these incumbrances, and there is little doubt that this was effected by a cross of the South Down. The sheep was well adapted for the Downs, but for the enclosures of Shropshire something more docile was required, consequently recourse was had to the Leicester." The crossing and re-crossing at length gave place to the practice of careful selection, and thus uniformity was sought for and attained, and the present superior breed was established. It is now held that no further cross is required.

The Oxfordshire Down sheep is a very valuable breed, originating from a cross between the improved Cotswold and the Hampshire or West-Country Down. Their size being less than the Cotswold, they are better adapted for the ordinary management of a light land farm. This breed is very similar to that first introduced by Mr. Twynam, to which allusion has been made, but probably the South Down has been used as well as the Hampshire Down.

Although Mr. Twynam may perhaps have a claim to priority in crossing the Hampshire Down ewe with the Cotswold ram, yet from various causes, and probably because the Hampshire hills were scarcely adapted for such large sheep, they failed to establish themselves in this locality; whilst a very few years afterwards a similar experiment was tried in Oxfordshire, and, whether from a milder climate, more fertile pasturage, or other causes, the result was a complete success.

Mr. S. Druce, of Eynham, Oxon., favors the writer with the following short communication on the subject:

"The foundation of this class of sheep was begun about the year 1833 (see vol. xiv, p. 211,\* of the Journal of the R. A. S. E.), by using a well-made and neat Cotswold ram with Hampshire Down ewes. At the same period several breeders of sheep in this neighborhood also tried the experiment; consequently there has always been an opportunity of getting fresh blood by selecting sheep which suited different flocks, and thereby maintaining the uniform character which is now established.

"As to the result of this crossing, I would refer you to the names of the following, who usually exhibit at the "Smithfield Club" Show, viz: Messrs. John Hitchman, Little Milton, Oxon.; Wm. Gillett, Brize Norton, Witney, Oxon.; W. Hobbs, Minsey

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\* In the communication referred to, Mr. Druce gives a table, showing his ideas of the comparative value of the different breeds of sheep, the result of which is in favor of the cross-bred. He adds, "With ordinary skill in sheep-farming, I find no difficulty in keeping the form and size of the animal, as it should be; the wool of a valuable quality, and not deficient in quantity; and I maintain that the good qualities can be better secured by employing the cross-bred animals on both sides than by confining the practice to the first cross."

Hampton, Gloucestershire; A. Edmunds, Longworth, Berks.; J. B. Twitchell, Wilby, Northamptonshire; C. Howard, Biddenham, Beds.; William Hemming, of Caldecot, near Moreton-in-the-Marsh, Gloucestershire, &c., &c. And amongst ram breeders I would name J. Hitchman, J. Roberts, C. Gillett, W. Gillett, J. Bryan, His Grace, the Duke of Marlborough, H. L. Gaskell, Esq., H. Barnett, Esq., all in this neighborhood, and who offer sheep by auction the second Wednesday in August annually, at Oxford."

There are few districts in England in which some advantage has not been derived from the cross breeding of sheep. Even the little *mountain sheep* of Wales has been greatly improved by the *Chevoit* ram, a larger, superior, but still a mountain sheep. At the same time the *Chevoits* themselves have been improved for the butcher by crosses with the Leicester, the Cotswold, and the Down. The progeny have been increased in size, and fattened more readily. This breed has also been considerably improved by selection.

The *black-faced heath* breed, too, so well suited to mountainous districts in which heath abounds, whilst it has been supplanted in certain districts by the *Chevoit*, has, in other heathy localities, displaced the latter. Although very slow in reaching maturity, the mutton is much esteemed; and the lambs from a first cross with a Leicester ram, fatten readily when removed to more favorable pasturage than the native habitat of the breed.

The testimony in favor of the advantages to be derived from the cross-breeding of sheep when the purpose sought for is limited to the first cross is so strong that, however forcible may be the arguments of the advocates of pure breeding with reference to stock sheep, they sink altogether in weight when sheep for the butcher are concerned. We have noticed the advantageous custom of crossing the Dorset and Somersetshire ewes with the Down ram, thereby improving both the quality and the disposition to fatten of the lambs, whilst the early lambing and nursing qualities are equally secured.

In Norfolk an intelligent and experienced correspondent assures us that cross breeding is of the utmost importance to the light land farmers, and that the crosses most esteemed are the South Down and the Hampshire ewes crossed with the Leicester and the Cotswold ram, by which earlier maturity is secured, together with an increase both of wool and mutton. The cross between two comparatively pure breeds is most esteemed. Most of the graziers in the locality of the writer (Mr. Coleman) speak strongly in favor of the first cross, as possessing both early maturity and a propensity to fatten. The inconvenience of the system is the necessity induced either of selling out every year, or otherwise of keeping up a pure flock, in order to afford materials for crossing. It may be observed that although generally, for the purposes of the butcher, a ram of a large breed is necessary, this is not essential when a permanent improvement is sought for; improved shape and superior quality often follow the ram of a smaller breed. Many owners of sheep, whose flocks were originally cross-bred, declaim very forcibly on the evils of crossing and the necessity of pure breeding.

We cannot do better, in concluding our paper, than gather up and arrange in a collected form the various points of our subject, which appear to be of sufficient importance to be again presented to the attention of our readers. We think, therefore, we are justified in coming to the conclusions:

1st. That there is a direct pecuniary advantage in judicious cross-breeding; that increased size, a disposition to fatten, and early maturity are thereby induced.

2d. That whilst this may be caused for the most part by the very fact of crossing, yet it is principally due to the superior influence of the male over the size and external appearance of the offspring; so that it is desirable, for the purposes of the butcher, that the male should be of a larger frame than the female, and should excel in those peculiarities we are desirous of reproducing. Let it be here, however, repeated as an exceptional truth, that though as a rule the male parent influences mostly the size and external form, and the female parent the

constitution, general health and vital powers, yet the opposite result sometimes takes place.

3d. Certain peculiarities may be imparted to a breed by a single cross. Thus, the ponies of the New Forest exhibit characteristics of blood, although it is many years since a thoroughbred horse was turned into the forest for the purpose. So, likewise, we observe in the Hampshire sheep the Roman nose and large heads which formed so strong a feature in their maternal ancestors, although successive crosses of the South Down were employed to change the character of the breed.

It has been asserted by some observers, that when a female breeds successively from several different males, the offspring often bear a strong resemblance to the first male; which is supposed to arise from certain impressions made on the imagination or nervous system of the female. Although this is sometimes or often the case, we doubt very much whether it is so frequent as to be considered as a rule.

4th. Although in the crossing of sheep for the purpose of the butcher, it is generally advisable to use males of a larger breed, provided they possess a disposition to fatten, yet in such cases, it is of importance that the *pelvis* of the female should be wide and capacious, so that no injury should arise in lambing, in consequence of the increased size of the heads of the lambs. The shape of the ram's head should be studied for the same reason. In crossing, however, for the purpose of establishing a new breed, the size of the male must give way to other more important considerations; although it will still be desirable to use a large female of the breed which we seek to improve. Thus the South Downs have vastly improved the larger Hampshires, and the Leicester the huge Lincolns and the Cotswolds.

5th. Although the benefits are most evident in the first cross, after which from pairing the cross-bred animals, the defects of one breed or the other, or the incongruities of both are perpetually breaking out, yet, unless the characteristics and conformation of two breeds are altogether averse to each other, nature opposes no barrier to their successful admixture; so

that, in course of time, by the aid of selection and careful weeding, it is practicable to establish a new breed altogether. This, in fact, has been the history of our principal breeds. The Leicester was notoriously a cross of various breeds in the first instance, although the sources which supplied the cross is a secret buried in the "tomb of the Capulets." The Cotswold has been crossed and improved by the Leicester; the Lincoln, and indeed all the long-wooled breeds, have been similarly treated. Most of the mountain breeds have received a dash of better blood, and the short-wooled sheep have been also generally so served. The Hampshire and the present Wiltshire Downs have been extensively crossed; the friends of the Shropshire cannot deny the "soft impeachment;" and the old black-faced Norfolks have been pretty well crossed out altogether. The Dorsets and Somersets remain pure as a breed, although they are continually crossed to improve their lambs. The South Down is perhaps one of the purest breeds we have. No one asserts that the immense improvement of this breed by Ellman was due to any crossing; whether the increased size and further improvement which it has received in other counties have been effected in all cases without a cross of any kind, may be in the minds of some a matter of doubt; yet it is only right to give the arraigned, in the absence of any proof to the contrary, the benefit of such doubt, and consider them still as pure as ever.

We confess that we cannot entirely admit either of the antagonistic doctrines held by the rival advocates of crossing and pure breeding. The public have reason to be grateful to the exertions of either party; and still more have they respectively reason to be grateful to each other. We have seen that Mr. Humphrey cheerfully acknowledges the benefit he derived from Mr. Jonas Webb's rams. Had he grudged the expense of seeking his improvements from such a renowned flock, and been satisfied with inferior rams, he would not have achieved the success which has crowned his exertions. So likewise with the Oxfordshire breed. What matters it whether

the localities occupied by these sheep were divided between their ancestral breeds or occupied as now by their cross-bred descendants; the public is benefited by having better mutton than the Cotswold alone would furnish, and more valuable wool than the Downs could supply; whilst the breeders, finding their account in their balance-sheet, have very properly perpetuated the breed which has paid so well. Our purpose has been to hold the scales fairly between both systems, having no prejudices to serve. Thus, in defending the system of crossing from some of the objections that have been urged against it, we have no wish to be thought forgetful of the merits of a pure breed; on the contrary we would instance with pleasure the remarkable success that has attended the careful selections which in the hands of Mr. Merson, of Brinsworthy, near North Molton, Devon, has brought out the capabilities of the little Exmoor sheep to an amount of excellence which no inspector of the ordinary breed would have believed them capable of attaining. But whilst this instance proves how much can be done by careful selection, vigorous weeding and pure breeding, and conveys a warning to any rash and heedless practitioner of crossing, yet, if we regard it as a bar against the system, we deprive by anticipation the spirited introducer of this great improvement of the fair reward for his labors which he has a reasonable prospect of obtaining from the proprietors and improvers of other mountain-breeds.

Although the term *mongrel* is probably correct as referring to a mixed breed, yet as it is generally used as a term of reproach, it should not be fairly applied to those recognized breeds which, however mixed or mongrel might have been their origin, have yet by vigilance and skill become in the course of years almost as marked and vigorous and distinctive as the Anglo-Saxon race itself, whose name we are proud to bear, and whose mixed ancestry no one is anxious to deny.

Let us conclude by repeating the advice that, when equal advantages can be attained by keeping a pure breed of sheep, such pure breed should unquestionably be preferred; and that,



although crossing for the purposes of the butcher may be practiced with impunity, and even with advantage, yet no one should do so for the purpose of establishing a new breed, unless he has clear and well-defined views of the object he seeks to accomplish, and has duly studied the principles on which it can be carried out, and is determined to bestow for the space of half a lifetime his constant and unremitting attention to the discovery and removal of defects.

## PRINCIPLES OF HAY-MAKING.

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### THE CHANGES WHICH TAKE PLACE IN THE FIELD AND IN THE STACK.

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BY DR. AUGUSTUS VOELCKER.

If grass or clover could be made into hay without undergoing any change in composition, the hay, when made, would no doubt be found as valuable as the green food from which it was derived. From exposure to the broiling heat of the sun on a hot summer's day, cut grass or clover hardly lose anything else but water, neither do their constituents undergo material alterations if the grass is not much bruised, and the drying process takes place with sufficient rapidity. The green color, sweet taste, and aromatic smell of well-made hay, plainly show that such is the case, and that hay-making is not always or necessarily attended with loss of nutritive matter. I am aware, however, that many practical men maintain the opinion that grasses and clover are less nutritious as hay, than when consumed green; though this may be true as a matter of fact in nine cases out of ten, I conceive this is not a matter of necessity, but, if it were always practicable to resort to artificial means of dessication, or to have under complete control the natural drying process in the field, no material loss would be experienced; the green color of the grass would be preserved, nothing but water would escape, and all the solid constituents

remain behind, in much the same state of combination in which they occur in the succulent produce of our grass-fields.

No attempt has been made as yet to apply artificial drying processes to hay-making on a large scale, and I question much whether in ordinary farm practice, it is worth while seriously to entertain suggestions for drying grass by artificial heat, dry currents of air, or the combined action of these two agents. The special question whether sewage grass grown in the immediate neighborhood of large towns, can be profitably made into hay by artificial means, remains yet to be solved. In ordinary farm practice hay-making, in a trying season, will probably always be subject to more or less of waste in feeding substances; it becomes us, therefore, to inquire how far the loss can be mitigated, if not avoided. To this end it will be useful to trace somewhat in detail, the nature and extent of the injury which grass sustains in hay-making, since hitherto little has been done, in this direction. Such losses are generally traceable:

1. To prolonged showery weather after the grass has been cut, so that it ultimately gets wet and half-dried, and has to be moved frequently on the ground before it can be carted and stacked.

2. To bad management in the field and subsequent heating in the stack.

3. To the mistake of cutting the produce too early or too late in the season.

Prognostications of the weather are, to say the least of them, very deceptive, and though the sun may be shining when the grass is cut, predictions as to the continuance of fine weather cannot be relied upon. Over one great cause of the loss, the farmer then has little or no control; it is not so, however, with the two remaining causes; though it is to be feared that injuries thus done to hay are too frequently put down altogether to bad weather.

## I.—UNPROFITIOUS WEATHER DURING THE HAY-MAKING SEASON.

Grass and clover, when ready to be cut down, contain a considerable quantity of sugar, gum, mucilage, albuminous, and other soluble compounds, which are all liable to be washed away by heavy showers of rain. As long as grass is still quite fresh, rain falling upon it has little or no injurious effect, for, fortunately, a coating of waxy or fatty matter covers the epidermis, and wraps, so to speak, the whole vegetable matter in a water-proof mantle. Rain for this reason may fall for days on newly-cut grass, without doing any injury to it; but the case is very different, if by repeated turnings, the crop has become more or less bruised, and rain then descends on the half-made hay; not only are sugar, gum, and other soluble matters then liable to be washed out, but the bruised state of the plants, admitting at least a partial diffusion of the various constituents through the lacerated cell-walls, induces fermentation, which if not checked at once, causes further loss. During fermentation, soluble albumen and sugar are destroyed—two of the most valuable elements of nutrition. In showery weather, grass recently cut should for this reason not be turned over more than is absolutely necessary, and under all circumstances it is desirable to handle the crop as lightly as possible, in order that it may not get much bruised. That the loss in our hay crop, under these circumstances, is at times great, scarcely admits of a doubt, and it is to be regretted that there are no experiments on record which exhibit in figures their exact amount. Instead of analytical results, I am able, however, to give a practical illustration from the use of some clover hay, which was made in very wet weather, in some experiments tried upon sheep. With a view of ascertaining the practical feeding value of several articles of food, I supplied weighed quantities of different foods to six pens of Cotswold sheep, each containing four animals. To one of the pens nothing but this clover hay cut into chaff was given. When first put up for experiment, on the 9th of November, the four sheep weighed respectively:

	Lbs.
No. 1, .....	96
" 2, .....	101
" 3, .....	99½
" 4, .....	93
Together, .....	389½

During the first fortnight each sheep received 1½ lbs. of clover hay chaff per day, and care was also taken to provide fresh water.

At the end of the fortnight the four sheep were put on the weigh-bridge and then weighed:

	Lbs.
No. 1, .....	95
" 2, .....	100
" 3, .....	98½
" 4, .....	91½
Together, .....	385

Finding that all four sheep had lost in weight, I gave them during the next fortnight, 2 lbs. each, per day. On the 7th of December they weighed:

	Lbs.
No. 1, .....	94
" 2, .....	101
" 3, .....	98
" 4, .....	88
Together, .....	381

Thus, notwithstanding the larger amount of food, the sheep had lost, together, 4 lbs., since the last weighing.

Knowing that the clover hay was made in wet weather, and long on the ground before it was carted and stacked, and having experimentally found a fair allowance insufficient to support the live weight of one sheep, I next gave them as much of the same hay as they would eat, and instead of cutting the clover into chaff as before, supplied it as taken from the stack. The food not consumed was weighed back each day, and found to consist mainly of the harder and less palatable stems of clover. From the

8th of December to the 14th, the four sheep ate  $78\frac{1}{2}$  lbs. of clover; in the next week, 79 lbs., and in the next, 76 lbs., then  $78\frac{1}{2}$  lbs.; from the 4th of January to the 11th, inclusive, they consumed 74 lbs., and in the following week,  $64\frac{1}{2}$  lbs.; then again  $73\frac{1}{2}$  lbs., then  $63\frac{1}{2}$  lbs., and in the last experimental fortnight,  $76\frac{1}{2}$  lbs. in one week, and 63 lbs. in the last.

The periodical weighings of the four sheep are incorporated in the following table:

SHEEP.	WHEN PUT UP FOR EXPERIMENT.						Loss, ~
	Nov. 9.	Dec. 21.	Jan. 4.	Jan. 18.	Feb. 1.	Feb. 15.	GAIN, †.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
No. 1.....	96	95	98	$94\frac{1}{2}$	95	96	.....
No. 2.....	101	100	100	$102\frac{1}{2}$	105	105	†4
No. 3.....	$90\frac{1}{2}$	96	98	$98\frac{1}{2}$	100	90	-8½
No. 4.....	93	89	$85\frac{1}{2}$	$85\frac{1}{2}$	87	$87\frac{1}{2}$	-5½
	$389\frac{1}{2}$	382	$376\frac{1}{2}$	381	$387\frac{1}{2}$	$387\frac{1}{2}$	Total, -2

This experiment is interesting in two ways. It shows, first, the folly of supplying animals with bad hay alone, and proves, secondly, that clover hay can get deteriorated by rain, long keeping and frequent turnings in the field, to such an extent that any amount which sheep will consume is barely sufficient to maintain their original weight. Messrs. Lawes and Gilbert have shown that sheep fed upon well-made hay alone increase in weight. The experiment, it will be seen, was continued for a period of more than three months, and the weighings done by myself in person. These practical results illustrate more forcibly the serious injury to which clover is subject when made into hay under an unfavorable season, than any analytical data can possibly do. Having, however, made a practical analysis of the clover, I may as well point out its general composition.

## COMPOSITION OF CLOVER HAY INJURED BY RAIN AND BADLY MADE.

	Dried at 212° Fahr.	
Moisture, .....	20.45	.....
*Nitrogenous organic matter, .....	8.50	10.69
Non-nitrogenous substances, .....	64.27	80.79
Mineral matter, (ash,) .....	6.78	8.52
	<hr/> 100.00	<hr/> 100.00
*Containing nitrogen, .....	1.36	1.71

I regret that I did not determine at the time the percentage of woody fibre, nor the amount of matters soluble in water. However, the comparison of the preceding analysis with that of well-made clover hay, sufficiently indicates the very inferior character of the clover employed in the feeding experiments.

On an average good clover hay contains:

Moisture, .....	16.60
*Nitrogenous substances, .....	15.81
Non-nitrogenous substances, .....	60.00
Mineral matter, (ash,) .....	7.59
	<hr/> 100.00
*Containing nitrogen, .....	2.52

Although the percentage of nitrogen in food does not afford invariably the means of determining with anything like accuracy, its relative feeding value, in the case of clover hay a very low percentage of nitrogen always indicates inferior quality, for as the leaves and more succulent portions of clover are much richer in nitrogen than its hard stems, a small percentage of nitrogen shows that the more delicate, brittle, and more nutritious leaves have been wasted to a great extent, in the process of hay-making. Compared with good clover hay, the injured sample contained little more than half the amount of nitrogenous or flesh-forming matters, and was no doubt rich in indigestible woody fibre.

## II.—LOSS BY BAD MANAGEMENT IN THE FIELD, AND SUBSEQUENT FERMENTATION IN THE STACK.

Although hay-making is a simple operation, yet experience and judgment are required to decide when to cut the grass, when to handle and when to stack the hay. I have seen farmers

spending labor in turning hay on overcast days, on which a dew-point hygrometer showed the air to be nearly saturated with moisture, proving that evaporation could not possibly take place at the time, and rain might be expected at any moment. In such a state of the atmosphere it is not only useless, but positively injurious, to knock about half-made hay, for it tends to bruise it and to render it more liable to be attacked by the rain of which the barometer, or more decidedly the hygrometer, has given previous warning. Frequent turnings of half-made hay should be avoided, especially in the case of clover, when the finer and more nutritious parts—the heads and small leaves—are particularly liable to be knocked off by clumsy handling.

It is further well-known that hay, when badly made in the field, loses subsequently in the stack both in weight and in quality; but the nature of the changes it undergoes when it heats or ferments in the stack are not so well understood; it may, therefore, not be amiss to describe them as briefly as possible. Let me direct attention to a second analysis of good clover or meadow hay, drawn up more in detail by Professor Way:

## AVERAGE COMPOSITION OF CLOVER HAY.

	Dried at 212° Fahr	
Moisture,.....	16.60	.....
Fatty matters,.....	3.18	3.18
*Albumen and similar nitrogenous compounds, (flesh-forming matters,).....	15.81	18.96
Gum, sugar, muclage and carbon-hydrates, readily convertible into sugar,.....	34.42	41.27
Indigestible woody fibre, (cellulose,).....	22.47	26.95
Mineral matter, (ash,).....	7.52	9.01
	100.00	100.00
*Containing nitrogen,.....	2.53	3.03

The preceding analysis represents the average of 75 analyses of clover, and a few other plants which are usually found amongst clover seeds. Since varieties differ much amongst themselves, corresponding differences in composition must be



looked for in clover hay, according as one species or another prevailed in the field in which it grew; the time of cutting will also much affect the result. The above figures, therefore, admit only a *general* application. Clover hay generally absorbs and retains a little more water than common meadow hay under the same circumstances, and when in good condition contains more sugar, gum, and analogous compounds than meadow hay from which it is chiefly distinguished by a much larger proportion of nitrogenous or flesh-forming matters.

Taking the mean of twenty-five analyses of common meadow hay, we obtain the following:

## AVERAGE COMPOSITION OF MEADOW HAY.

	Dried at 212° Fahr.	
Molsture,.....	14.61	.....
Wax and fatty matters,.....	2.56	2.99
*Albumen and other nitrogenous compounds, (flesh forming matters,).....	8.44	9.88
Sugar, gum, starch and similar compounds, (respiratory substances,).....	41.07	48.09
Indigestible woody-fiber, (cellulose,).....	27.16	31.80
Mineral matter, (ash,).....	6.16	7.24
	<hr/> 100.00	<hr/> 100.00
*Containing nitrogen,.....	1.35	1.58

Hay, whether produced from clover or natural grasses, evidently contains a good deal of ready-formed sugar or soluble organic matter, having an analogous composition, and readily convertible under the influence of ferments, first into sugar, and afterwards into alcohol and carbonic acid. These constituents are essential elements in all liquids and moist substances capable of entering into fermentation. No less essential are albumen, gluten and other nitrogenous compounds. Some of the nitrogenous matter in hay occurs in a soluble, some in a condition insoluble in water. Soluble albumen and all albuminous compounds exposed for a short time to air and moisture, are readily transformed into ferments; that is to say, agents that play the same part as yeast in setting up fermentation in sugary compounds. It appears that when a vegetable

juice ferments, the admission of the air is necessary to the commencement of the change which then goes on, even if the air be afterwards excluded. Ferments almost invariably contain the germs of minute fungi, which become rapidly developed and multiplied in the measure in which the fermentation proceeds. Albuminous compounds that have been exposed for a short time to the influence of the air, as in ordinary ferments, are only capable of acting as inducers of fermentation when in a state of decomposition. This explains satisfactorily why hay that has been subject to excessive fermentation generally is very innutritious, such a great loss of flesh-forming, as well as sugary constituents, being implied by fermentation.

The most reasonable explanation of the fermentation of sugar has been given by Liebig. Ferments, the great German chemist says, being in a state of decomposition, have their constituent particles in a state of motion, and by communicating, mechanically, on impulse or motion to the particles of sugar, destroy the balance of affinities, to which its existence is owing, and thus give rise to a new balance or equilibrium more stable under existing circumstances. The elementary particles of the sugar being disturbed in their previous arrangement, group themselves according to their individual affinities; and while the carbon forms on one side a compound containing all the hydrogen (alcohol) it yields, on the other a compound containing the greater part of the oxygen (carbonic acid).

Alcoholic or vinous fermentation may thus be briefly described as the breaking-up of sugar under the influence of ferments, and the reconstruction of constituent elements of sugar into alcohol and carbonic acid.

Another condition favorable to fermentation is an elevated temperature. If the thermometer ranges from 65° to 80° Fahr., fermentation proceeds with rapidity, whilst at a lower temperature it goes on more slowly, and is stopped altogether at 32° Fahr.

In the absence of a sufficient amount of water, many substances otherwise capable of entering into fermentation, remain

apparently unaltered for a long period. Too much or too little water is alike unfavorable to the process. If one part of sugar is dissolved in three or four parts of water, and yeast is added, and the sugary liquid then placed in a warm room, no fermentation takes place, although three of the essential conditions have been fulfilled. Such a solution will require to be diluted with about an equal weight of water, in order to set up active fermentation. On the other hand, sugar dissolved in, say 16 to 20 parts of water, after the addition of yeast, either ferments but very slowly, or rapidly turns acid in a warm place.

These facts have a direct bearing on the proper conservation of hay. As long as grass and clover are still quite fresh, the proportions of water to that of sugar in the green plant, are too large to encourage fermentation; the nitrogenous constituents in newly-cut grass, moreover, only become ferments after the vitality of the plant has been destroyed, and the vegetable cells and vessels have become ruptured by partial drying, and their contents have been mingled together.

With the evaporation of water, and to a certain extent the more or less complete destruction of the living organization of the plant, the conditions become more favorable for active fermentation. By degrees the drying crop arrives at a stage when the relative proportion of sugar and of the remaining moisture are most conducive to fermentation. Should the weather unfortunately turn showery at that stage of the hay-making process, and the air become saturated for many days and weeks together, the half-made hay begins to ferment already in the field. When this takes place the hay loses in quality, and becomes much more liable to heat afterwards in the stack. If, on the contrary, fine and warm weather sets in, and evaporation proceeds with rapidity, the percentage of moisture soon sinks sufficiently low to prevent altogether, or greatly to retard fermentation. The hay remains sweet, and shows far less tendency to heat in the stack, even if it actually contains more moisture, than hay made in unfavorable weather. The more quickly hay can be made in the field, and the less it gets bruised or loses

color there, the less likely it is to heat in the stack. However, much hay is injured when it is quickly made, and in a fine season; it looks to be ready before it is so.

#### HEATING IN THE STACK.

If dried ever so carefully in the field, hay, nevertheless, heats to some extent in the stack. A slight fermentation so far from being injurious, may be useful, for as is well known, peculiar aromatic principles are thus generated, which certainly renders hay more palatable, and it may be, more nutritious. As long as the green color is retained there is no danger of the hay losing in quality, but if the heat in the stack becomes so intense and continuous as to turn the hay decidedly brown, I have no hesitation in saying that considerable loss in feeding matter is incurred.

Some feeders of stock prefer brown hay to green, and it cannot be denied that the former often has a more aromatic smell and a more savory taste than the latter. Although brown hay is much relished by stock, I do not think it desirable to put up hay so wet that it will afterwards turn brown in the stack; for, as I shall show presently, the sugar that is wasted when hay heats and turns brown in the stack, appears to me of greater value than the aromatic savory substances which are generated by that process.

Some years ago I had an opportunity of examining brown hay which had a peculiarly aromatic, quite fruity flavor. It tasted decidedly acid, and contained scarcely any sugar, but a good deal of mucilage, soluble brown humus-like compounds, with but a small proportion of soluble albuminous matters. On further examination, I found the acid in the hay to be acetic acid. The hay was very brittle, dark brown, and an analysis gave the following results:

## COMPOSITION OF BROWN, STRONGLY-FERMENTED HAY.

*General Composition.*

		Dried at 212° Fahr.
Moisture,.....	18.33	.....
Soluble organic matters,.....	14.81	18.13
Soluble mineral matters,.....	3.98	4.87
Insoluble organic substances,.....	60.29	73.82
Insoluble mineral substances,.....	2.59	3.18
	100.00	100.00

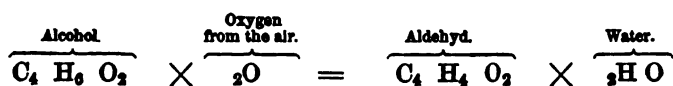
*Detailed Composition.*

		Dried at 212° Fahr.
Moisture,.....	18.33	.....
Fatty matters,.....	1.70	2.08
*Soluble albuminous compounds,.....	1.94	2.37
Mucilage, gum, brown extractive matters and traces of sugar,.....	9.24	11.31
Acetic acid,.....	1.93	2.36
Digestible fibre,.....	23.01	28.19
†Insoluble albuminous compounds,.....	8.75	10.71
Indigestible woody fibre (cellulose),.....	28.53	34.93
Soluble mineral substances,.....	3.98	4.87
Insoluble mineral substances,.....	2.59	3.18
	100.00	100.00
*Containing nitrogen,.....	.31	.33
†Containing nitrogen,.....	1.40	1.71

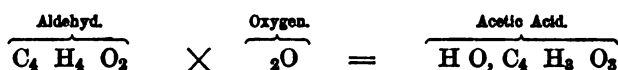
The occurrence of a considerable amount of acetic acid in this hay, and the all but complete absence of sugar, deserve a special notice. Vinegar manufacturers are well acquainted with the fact that all sugary substances may be employed for the production of *vinegar*, and that in the so-called rapid vinegar process a dilute alcoholic liquid in the presence of a porous substance, such as wood shavings or chopped straw, or under the influence of a ferment, is rapidly transformed into vinegar. Scientific chemists, moreover, have pointed out the relation which exists on the one hand between sugar and alcohol, and on the other between alcohol and acetic acid—the acid of vinegar—showing that the latter is formed by the absorption of oxygen; in other words that acetic acid results from the oxydation of dilute alcohol. It is clear, therefore, that the acetic

acid found in the heavier hay was produced at the expense of the sugar present in unfermented or only slightly-fermented hay.

Subsequently I had an opportunity of examining a rick of clover hay, which became so hot in the interior that it had to be disturbed. It had been made in a bad season and was stacked when too moist. On removing the top-layers of the rick the vapors emanating from the heated hay were found to have a peculiar pungent irritating odor, which particularly affected the eyes. A chemist could not doubt for a moment that these irritating vapors were due to the volatile inflammable compound which has received the name of Aldehyd. The same pungent odor may be noticed in vinegar manufactories at a certain stage of the vinegar-process, and it is well known that aldehyd is produced in abundance when weak alcoholic liquids are allowed to trickle slowly over wood-shavings kept loosely in perforated capacious vats freely admitting air. In this operation a large surface is exposed to the air, and the alcohol transformed into aldehyd by oxydation. Alcohol consists of four equivalents of carbon, six of hydrogen, and two of oxygen, its composition consequently may be expressed by the formula  $C_4 H_6 O_2$ . By taking up two equivalents of oxygen from the air alcohol becomes changed into aldehyd, with the production of two equivalents of water. This simple change may be represented as follows:



Aldehyd thus differs from alcohol by containing two equivalents less of hydrogen. The principal interest with which aldehyd is invested, arises from the facility with which it absorbs oxygen, in consequence of which it is readily transformed into acetic acid. The addition of two equivalents of oxygen to aldehyd is all that is required for this change, as will be seen from the following formula:



This oxydation of aldehyd is accompanied with the evolution of much heat. If the supply of air be insufficient, the acidification of dilute alcoholic liquids or substances capable of entering into alcoholic fermentation, may become so imperfect that the alcohol is merely changed into aldehyd—a product intermediate between alcohol and acetic acid; and as aldehyd is an extremely volatile substance, it may escape without becoming further oxydized into acetic acid. In the interior of a closely-packed hay-rick in an active state of fermentation, in which the sugar is first converted into alcohol and carbonic acid, the supply of air is necessarily but limited, and hence it happened in the case before us, that although the vapors of aldehyd emanating from the clover hay-rick were so overpowering as to render it unsafe for a man to stand on the rick, yet so little acetic acid was formed in the hay that I did not consider it worth while to determine the amount quantitatively.

My observations on the changes which badly-made hay undergoes in the stack, show clearly that excessive fermentation destroys sugar, one of the most valuable constituents of hay, which passing first into alcoholic fermentation is finally lost, either in the shape of aldehyd or that of acetic acid according as the supply of air is more or less copious.

A glance at the following table will show that the hay, as containing 38 per cent. of water, was far too wet for stacking:

COMPOSITION OF STRONGLY-FERMENTED CLOVER HAY.

*General Composition*

	Dried at 212° Fahr.	
Moisture,.....	38.22	.....
Soluble organic matters,.....	9.40	15.17
Soluble mineral matters,.....	3. 6	6.39
Soluble organic substances,.....	46.01	74.23
Insoluble mineral substances,.....	2.61	4.21
	<hr/> 100.00	<hr/> 100.00

*Detailed Composition.*

Water, .....	38.02	.....
Fatty matters, .....	.90	1.45
*Soluble albuminous compounds, .....	1.88	3.03
Gum, mucilage, brown extractive matters and a little sugar, .....	6.63	10.69
Digestible fiber, .....	15.55	25.09
†Insoluble albuminous compounds, .....	8.12	13.11
Indigestible woody fibre (cellulose), .....	22.33	36.03
Soluble mineral matter, .....	3.96	6.39
Insoluble mineral matter, .....	2.61	4.21
	100.00	100.00
*Containing nitrogen, .....	.30	.48
†Containing nitrogen, .....	1.30	2.09

Apart from the large excess of water, the high percentage of indigestible woody fiber shows that this sample was of very inferior quality, and that the excessive fermentation to which it was subject in the rick, destroyed much sugar, as well as albuminous compounds. Bad as this hay was, it was by no means at its worst, for on keeping in the stack it became reduced by degrees to a dark brown mass which crumbled under the fingers like snuff, and became only fit for the dung-hill.

It is well, therefore, to remember that highly-fermented hay, which has passed through the acetous acid fermentation, on prolonged keeping in the rick undergoes a kind of slow combustion or eremacausis, in consequence of which compounds like those present in peat are formed, and much valuable feeding matter is entirely resolved into gaseous products.—*Journal of the Royal Agricultural Society.*

The remainder of Dr. Voelcker's valuable paper, is devoted to the subject of

#### LOSS ON CUTTING GRASS AND CLOVER EITHER TOO EARLY OR TOO LATE IN THE SEASON.

In considering this subject, Dr. V. brings forward the results of a series of experiments made by himself at the Cirencester Agricultural College. He divided a field of clover of even growth into twelve plots containing one square rod each. Some



of these plots were mowed five times in the course of three and a-half months—the first cutting being on the 15th of April, and the last on the 28th of July. The clover at the different cuttings was weighed and analysed, and the results are given in elaborate tables.

Dr. V. states that his object in commencing to mow the clover at the time mentioned, was to ascertain whether the eating off young clover early in the spring, as is sometimes the practice when food is scarce, was attended with loss in food or not. Except for this object there would have been no use in mowing clover so early in the season.

Without attempting to give in detail the results obtained by these experiments, it may be stated it was found that the percentage of nutritive matter in clover was least in its earliest growth, that this percentage gradually increased till the plants burst into flower, at which stage the amount of nutritive matter remained nearly stationary for a few days, and that it afterwards rapidly diminished—the results thus strikingly agreeing with practical observation.

An important fact brought out by the experiments is, that a much greater amount of solid food was obtained from one cutting of clover that was cut at the flowering stage, than from the same extent of land on which the clover was previously cut several times, and therefore not allowed to reach the flowering stage. The following extract is interesting in reference to this point, and as showing important changes in the clover plant at a particular stage of growth:

“During the fortnight which elapsed between the 12th and 26th of May, the clover appeared to come rapidly to perfection; it was then in full flower and looked remarkably vigorous. In this period the assimilation of carbon through the medium of the leaves or roots appears to be very great, for whilst sugar and other carbon-hydrates are at this time abundantly produced, little or no further accumulation of nitrogenous substances appears to take place. In the case before us the two

mowings on plot 3, contained exactly as much nitrogen as the one mowing on plot 4. Calculated per acre, we find in the clover of the 12th of May, 72 lbs. of nitrogen, and in the second mowing on the 26th of May, 3.2 of nitrogen, or 75.2 lbs. in all—the identical quantity of nitrogen which is contained in the much larger weight of clover obtained on plot 4, by cutting it only once, on the 26th of May. At this stage, as it seems, much carbon is assimilated by the plant for the production of sugar and other carbon-hydrates, which are serviceable in the animal economy for the production of fat; whilst the nitrogenous substances previously taken up are diffused, and probably undergo greater elaboration. In both these respects the clover becomes more nutritious and valuable at this time in spite of its percentage in nitrogen being smaller.

“Indeed, *within certain limits*, we may say that the amount of nitrogen in clover diminishes in the measure in which its nutritive value increases. We must, however, be careful how we apply this rule, for a small percentage of nitrogen may indicate alike the presence of much or little sugar. In succulent, sweet-tasting, and really nutritious clover this percentage is small, comparatively speaking, because the nitrogenous or albuminous compounds in the plant are diffused through a large mass of carbon-hydrates or fat-producers, and in over-ripe, woody, insipid, and innutritious clover the percentage of nitrogen also is small, because such clover contains little sugar and much indigestible woody fibre or cellulose, which is a non-nitrogenous substance.”

Commenting on other points connected with his investigations, Dr. V. observes: “There is positive evidence that at the period when clover bursts into flower, the assimilation of nitrogenous constituents appear to come to a stand-still, whilst that of carbon-hydrates is proceeding with greatly accelerated speed.”

In reference to the loss which clover sustains in weight and quality when it is allowed to stand after it has arrived at perfec-

tion, Dr. V. gives some interesting facts showing the diminution of nitrogenous matters from week to week, as the clover was cut. "On the 16th of June we found 11.31 in the dry produce; on the 23d only 9.31; in the week following 8.25; and this sinks to 7.94 in another week, and on the 18th of July we get only 6.62 per cent., and ten days afterwards 6.06 per cent. of nitrogenous matter in the dry clover hay. We have here a steady decrease of the percentage of nitrogen in the dry produce at each experimental period from the 16th of June to the 28th of July. Thus the perfectly dried clover hay contained—

	Per cent. of Nitrogen.
On the 16th of June,.....	1.81
“ 23d “ .....	1.49
“ 30th “ .....	1.32
“ 7th of July,.....	1.27
“ 18th “ .....	1.06
“ 28th “ .....	.97

“This loss in nitrogenous matter appears to me to be chiefly due to the comparatively small proportion of fine green leaves, and greater abundance of woody matter which is found in over-ripe clover hay. At the same time I do not think the loss is due entirely to this cause, and the whole subject is well worthy a special investigation. It is extremely difficult to trace with precision the changes which nitrogenous matters undergo in the living plant, to determine their influence in the assimilation of atmospheric plant-food, or to account for their accumulation in plants at certain stages of their growth, and their diminution at others.”

## THE DEW OF HEAVEN—INFLUENCE OF FORESTS.

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BY CUTHBERT W. JOHNSON.

The study of atmospheric phenomena has only in modern days been regarded by the agriculturist at its real value. We search in vain in the works of the early English writers on rural affairs, for any rational observations on meteorology. The very first of these, old Judge Fitzherbert, (A. D. 1532,) had no ideas beyond advising the farmer to plant or sow in the increase or wane of the moon; and a quarter of a century later, Tusser (A. D. 1557,) had no other opinion of the atmosphere than that the planets influence the farmer's crops. Thus he writes:—

“ So here by the planets, as far as I dare,  
Some lessons I have for the husbandman's share.”

Nearly a century after this, we find Walter Blith, (A. D. 1649,) one of the best enlightened of the early English authors on agriculture, telling his brother-farmers when speaking of planting trees: “As for the moon's increasing or declining, matters it not at all; but be sure what sets are gathered one day be set the next.” (“English Improver,” p. 131.) Twenty years later, (A. D. 1669,) old Worlidge speaks of the dew, but only as prognosticating the weather to be soon expected: “If dews lie long in the morning, it signifies fine weather; if they vanish early, it presages rain.” (“Mystery of Agr.,” p. 301.)

Of the mother of dew, the insensible moisture of the atmosphere, they knew in those days but very little; and they were

utterly ignorant of its vital importance to the vegetable world. And yet we all know that the earliest writers in our possession had not disregarded meteorological appearances. Thus, as I have elsewhere remarked, it may now, according to Maury, be regarded as an established fact, that there is "a perpetual upper current of air flowing from South America to North Africa, and that this volume of air is nearly equal to that which streams to the southward with the north-east trade winds."

One can hardly read the observations in holy writ without being struck by the remarks of the sacred writers—observations which modern investigators seem often to verify. We are aware how currents of air have been proved to cross each other, and so return back to their sources the streams of air which the "trades" and other winds have withdrawn. Thousands of years since, we find it observed: "The wind goeth toward the south, and turneth about unto the north; it whirleth about continually, and the wind returneth again according to its circuits." (Ecclesiastes i. 6.) Job seems to have regarded as a mystery "the balancing of the clouds" (xxxvii. 16); but he was aware of how the rain exhausted those clouds (xxxvii. 11); but how that rain was produced out of the cloud he merely inquires (xxxviii. 28). The smallness and gentle falling of the drops of rain had not escaped his attention (xxxvi. 27).

Modern philosophers once disputed whether the dew descended from heaven or was emitted from the earth. It has long been decided that Solomon was right when he said that the dew "drops down" (Proverbs, iii. 20), and as Zachariah says (viii. 12), "from heaven." There are many other observations scattered through holy writ which seem to be not a little remarkable, when viewed in connection with modern scientific researches. For instance, it is now more than suspected, that the sun and all its planets and satellites, are *moving* around one vastly larger center, and that the central sun is very likely to be one of the Pleiades. Job asked, thousands of years

ago (xxxviii. 31): "Canst thou bind the sweet influences of the Pleiades."

The insensible vapor, whose birth is in the evaporation from the earth's surface appears again on the earth in its first and softest way, as dew. Several recent observations on this phenomenon will be full of interest to our readers. We must not forget, as I have often remarked, that the insensible deposition of water from the atmosphere is not confined to the *surface* of the soil. Wherever the atmosphere can freely penetrate, there the deposition of the dew, under favorable circumstances, takes place. This also often occurs in the interior of the soil, when evaporation is taking place from the surface. The amount of the dew deposited on the soil has been estimated by Dr. Dalton to be equal to five inches per annum, or about five hundred tons of water per acre. Less dew is usually formed during the first than in the second portion of the night.

The amount of water deposited in dew varies in different seasons and localities. Autumn, Steinmitz observes, is remarkable for its heavy dews, owing to the depression of the temperature during the nights. These are so abundant as sometimes to admit of measurement by the rain-gauge. In one night, towards the end of September, Luke Howard got one-hundredth of an inch of water from the dew, and in the last six days of October, eleven hundredths from copious dews and mists.

We must not then forget that dew is only one form in which the aqueous vapor of the atmosphere is deposited on the earth for the service of vegetation. The driest soils contain about 10 per cent. of moisture. We know that when soils are dried in a temperature of  $212^{\circ}$ , and exposed on their surface to air saturated with moisture, they absorb very considerable portions of water. Suppose a soil which weighs about 1,000 tons per acre is pulverized so as to be freely permeable by the atmosphere, and that such a soil, after being thoroughly dried, is exposed to the air, then we find from the experiments of Schubler, that it will absorb water in twenty-four hours:

	Tons.
If a sandy clay, equal to.....	26
If a loamy clay, equal to.....	30
If a stiff clay, equal to.....	36
If a garden mould, equal to.....	45

The inquiry is closely connected with the good effects produced in most soils by deepening and pulverizing them. Well pulverized soils absorb much more dew than when suffered to remain close. "Sands," observes Mr. Josiah Parkes, (Journal R. A. S., vol. v., p. 132), "appear to be powerful attractors, and in some countries to depend altogether on the nightly deposition of moisture for the support of their vegetation. It is to the copious dews that we have in a great measure to attribute the productiveness of the meadows bounded by rivers. The atmosphere in the neighborhood of currents of water becomes more highly charged with aqueous vapor than the atmosphere of the upland. A moisture is deposited from it, in such places on the grasses during the night, in globules of dew; hence the French expression that a river bedews (*arrose*) is more correct than the English one, that it *waters* a country. In India the deposition of dew near to rivulets, when all around is perfectly dry, is very marked." Colonel Sykes, (Trans. Roy. Soc., 1850, p. 354,) remarks, "that when at Poona, in September and October, if there was no deposition of dew anywhere else, it was yet found on the banks of rivulets and the Mota Mola river; but fifteen to twenty feet from the water were the limits of the deposition."

This interesting branch of our inquiry is well alluded to in a very useful and interesting little work just published by Mr. Andrew Steinnitz, entitled "Sunshine and Showers" (Reeve & Co.); a volume which I can safely commend to the perusal of all my readers. He remarks very truly, that "the quantity of aqueous vapor in the atmosphere is greatest in equal latitudes on the sea-coast; it diminishes in proportion as we advance into the interior of a continent. In Algeria, at the stations on the coast, after the driest and hottest days, immediately the sun has set, the soldier's uniform becomes wet with dew, and

in a single night the blades of knives in the pocket become rusted; but at thirty miles from the sea, night exposure is not attended with any inconvenience from the humidity of the air. This rule holds good in the interior of the United States, the Deserts of Africa and Asia, the Steppes of Siberia, and the interior of New Holland. The Deserts of Africa being entirely arid regions, present no evaporation; besides the extreme heat, which is increased by the reflection of the sands, opposes aqueous precipitation, and is one of the causes of the eternal sterility of that country."

The insensible moisture of the atmosphere of Europe varies in amount according to the direction of the wind, so that as Mr. Steinmitz observes (p. 30): "As every wind with west in it is more or less connected with that which comes to us laden with moisture from the Atlantic, it will not be surprising to know that westerly winds have the greatest influence on the degree of humidity in the air. Now, England is certainly a moist country, and that results from the fact that southerly and westerly winds are to northerly and easterly winds as 196.4 is to 135.0. In a mean of years we have the following winds:

	Days
North, .....	40.7
Northeast, .....	47.6
East, .....	22.6
Southeast, .....	19.9
South, .....	34.2
Southwest, .....	104.0
West, .....	38.3
Northwest, .....	24.1

If, however, the efforts of the husbandman in deepening and pulverizing his soils tend to the increasing of their supply of atmospheric moisture, his labors in another direction sometimes diminish it. "It is evident," says Dove, "that a vigorous vegetation produces rain, which, on the other hand, nourishes again that vegetation, and that the destruction of forests very often has destroyed the fertility of the soil. Previous to 1821, Provence and the Department du Var possessed a superfluity



of brooks and springs. In that year the olive trees, which formed almost forests, were killed by frost, and they were cut down to the root in 1822; since which time the springs dried up, and agriculture suffered. In Upper Egypt, the rains, which eighty years ago were abundant, have ceased since the Arabs cut down the trees along the Valley of the Nile towards Libya and Arabia. A contrary effect has been produced in Lower Egypt, through the extensive plantation of trees by the Pasha. In Alexandria and Cairo, where rain was formerly a rarity, it has since that period become more frequent.

"The proportion of forest or woodland required for an agricultural country, in order to ensure a regular and sufficient rain-fall without violent storms, has been estimated," observes Mr. Steinmitz, "at 23 per cent. for the interior, and 20 per cent. near the coast. This estimate by Rentzsch related to Germany; but in England the proportion, according to the same authority, is only 5 per cent., and even this is reduced by Sir Henry James, the head of the Ordnance Survey Department, to  $2\frac{1}{2}$  per cent. This is certainly a very small proportion, and below that of every other country, the next lowest being Portugal, which has very little woodland."

The influence of trees in adding to and preserving the water of springs and ponds, is well known. In some parts of England they are careful to have the oak planted around their ponds; and, bearing upon this fact, I may mention that the dew under some large oak trees by the side of my bowling-green, at Croydon, is always considerable of an evening; but that under a wych-elm growing by their side, the dew is almost always absent. The advantage of planting trees around ponds has been well alluded to by Mr. R. Orlebar, of Willingborough, (Jour. Roy. Ag. Soc., N. S., vol. ii., p. 110), although he appears to lay too entirely a stress upon the *shade* (and consequent retardation of evaporation) they afford to the water. He observes: "It is astonishing what an effect a little shade has in checking evaporation. A pond that is well shaded will hold water for weeks, after one of equal dimensions, but lacking

shade, will become dry. Yet how recklessly have I seen men cutting up every bush and tree round the banks of their ponds. True, a few leaves may drop into the water; but if the pond owner will take the trouble to observe the marvelous tenacity of a thoroughly-saturated leaf, he will, I am sure, be soon convinced that many an autumn must pass away ere the accumulation of leaves which may drop into his pond can do him any harm. Always, therefore, if possible, have the mouth of your pond on the north side, and the shade on the south side. The best shade is that given by fir trees [or other evergreens], for they give it all the year round. Moreover, a less quantity of leaf falls from them than from other trees, and that which does fall, being specifically heavy, falls straight, and is not likely to be blown by the wind when fallen. Neither are the branches of fir trees as liable as others to die and fall off, unless they are allowed to grow too thick together. It is a maxim among those who cultivate the fir for its beauty, that no tree of this sort should ever touch its neighbor. At the same time, in exposed situations, they must not be planted in too narrow a belt, or the wind will blow through and stunt them all. It may be as well, too, to remark that the Scotch fir, from its more hardy habit, is infinitely better adapted for exposure than its more delicate congener, the spruce. The yew would, perhaps, be even better for shade than the fir, but for its poisonous qualities. After the fir, I doubt whether there is, on the whole, any better plant for shade than the hawthorn bush. Its leaves sprout early, and fall late; and it possesses, besides, the great advantage that it forms its own fence."

An instance is given by Mr. Steinmitz, on the authority of Boussingault, of the influence of a plantation of fir trees upon the water of a spring: "A few years ago the Wolf Spring, in the Commune of Soubey, did not exist. At the place where it now rises, a small thread of water was observed after very long rains; but the stream disappeared with the rain. The spot is in the middle of a very steep pasture inclining to the south. Eighty years ago the owner of the land perceiving that some

firs were shooting up in the upper part of it, determined to let them grow, and they soon formed a flourishing grove. As soon as they were well grown a fine spring appeared in the place of the occasional rill, furnishing abundant water in the longest drought. For 40 or 50 years this spring was considered the best in Clos de Doubs. A few years since the grove was felled, and the ground turned again to a pasture. The spring disappeared with the wood, and is now as dry as it was ninety years since."

The interesting and somewhat differing way in which the leaves of plants appear to act in the receiving and disposal of dew was noticed by Mr. J. Parkes (*Jour. R. A. S.*, vol. v., p. 133). "A blade of grass," he observes, "is sometimes span-gled over with dew-drops, but it usually becomes wetted throughout its whole surface by the running together of the drops, and thus conducts the water to the earth in minute streamlets; whereas, the leaves of the clover, cabbage, nasturtium, and many other plants, will be found to collect it in distinct globules, which may be rolled about on the leaf without appearing to moisten it. These drops do not in fact touch the leaf, but rest and roll on a pillar of air interposed between them and the substance of the leaf. On very translucent nights I have seen the tender clover-leaf bend beneath the weight of its crystal load, discharge it on the ground, and immediately begin to collect another globule. Cup-formed and horizontal leaves and flowers seem to retain all, or nearly all, their collected dew for their special use, as if it were more beneficial to them so applied than to their roots." The repulsion of water by the leaves of certain plants, and by the feathers of water-fowl has also been investigated by Dr. C. Buist, (*Proc. Roy. Soc.*, 1857, p. 520). In some experiments carried on at Bombay, with four varieties of lilies and the lotus, he found that from the upper surface of the lily leaf the water runs off without wetting it, as it does off a glass or greased surface. From the lotus leaves it flows off like a pool of quicksilver, reflecting light from the whole of its lower surface. The repellent power is on the up-

per side of the leaf, only. "On examining," says Dr. Buist, "into the cause of this, I found the lotus leaf covered with short microscopic papilla, which entangle the air and establish an air-plate over the whole surface, with which in reality the water never comes in contact at all. Another peculiarity connected with this, was the singular respiratory pores of the lotus. The leaves of the lotus when full-sized, are from a foot to sixteen inches in diameter; on cutting off a leaf six inches broad, the stalk of which was less than the third of an inch in diameter, I was able to collect 33 cubic inches of air in an hour, when the vital energies of the plant must have been injured by its mutilation. At this rate a tank covered with lotus leaves would produce daily an atmosphere four feet in depth throughout its whole surface. When the leaf is pushed slightly under water, a constant succession of air-bubbles seem to arise from it at the rate of three a minute at each spiracle. The air-bubble diffuses itself as it is extricated, presenting a very broad base to the leaf, and blunt low-crowned apex, and seems detached with difficulty. The air-plate all over the surface must thus become continually renewed, and the arrangement kept perfect. Sensible respiration is not at all essential to the repelling power of leaves; the most beautiful manifestation of it that I have met with is in the *Pistia*, a little floating water-plant abounding in our shallow tanks, and resembling our common endive. When pushed under the surface it looks like a little mass of burning silver. The same appearance is presented on cabbages, young clover, and a vast variety of other leaves; it is the cause of the bright pearl lustre of dew. The same phenomenon is manifested on the wings and backs of divers when they dash into the water. In this case it has been ascribed, most erroneously, I believe, to the presence of grease or oil in the feathers, and is, I have no doubt, due to the presence of an air-plate repelling the water, so that it never comes in contact with the feathers at all. The trimming process so carefully performed by water-fowl, is probably an application of oil or grease, with the object of

separating or dressing the little fibers of the feathers, so as to produce an arrangement fitted to entangle the air. The reflection of light from the lower surface of the water is a proof of the want of contact. A piece of polished marble or of glass, a waxed, oiled, or greased surface, readily throws off the water without remaining wetted; but no reflection is in this case observable."

Such are the kind of interesting objects—such the phenomena which mark the finger of the Divine Architect—the love and care for the welfare of his creatures—even in the sparkling bubbles gliding from the leaf down to the root of a plant, or off the wings of a bird, so marvelously found that it floats in water, rises through the falling shower equally unwetted. These investigations, too, we must perceive, are fraught with a practical value; for they serve as teachers, that tend to increase the produce of the soil, and to the welfare of our domestic animals.—*Farmers' Magazine.*

## SOURCES OF FAT IN THE ANIMAL BODY.

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 BY J. B. LAWES AND J. H. GILBERT.

In 1842, Baron Liebig\* maintained that the fat of Herbivora must be derived in great part from the carbon-hydrates of their food, but considered that it might also be produced from nitrogenous compounds. MM. Dumas and Boussingault† at first called in question this view; but subsequently the experiments of Dumas and Milne-Edwards‡ with bees, of Persoz§ with geese, of Boussingault|| with pigs and ducks, and of ourselves with pigs¶, were held to be quite confirmatory of Liebig's view, at any rate so far as the formation of fat in the animal body from carbon-hydrates was concerned.

In 1864, however, at the Bath Meeting of the British Association for the advancement of science, Dr. Hayden, of Dublin, read a paper before the Physiological Section, in which, basing his conclusions upon certain physiological considerations of a purely qualitative kind, he argued that fat was not producible in the body from sugar and allied substances, but that both eventually served for the production of carbonic acid and water; and sugar being the most readily oxydized, so saved the combustion, and favored the storing of fat.

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\* Organic Chemistry of Physiology and Pathology, p. 81 *et seq.*

† Balance of Organic Nature, 1844, p. 116 *et seq.*

‡ *Comptes Rendus de l'Académie des Sciences*, vol. xviii, p. 531.

§ *Ann. de Chim. et de Phys.* vol. xiv. p. 408 *et seq.*

|| *Ann. de Chim. et de Phys.* vol. xiv, p. 419 *et seq.*; xviii, p. 444 *et seq.*

¶ "On the Composition of Foods in relation to Respiration and the feeding of Animals," Report of the British Association for the Advancement of Science for 1852

Again, in August, 1865, at a meeting of the Congress of Agricultural Chemists, held in Munich (at which one of the authors was present), Professor Voit\*, from the results of experiments with dogs fed on flesh, maintained that fat must have been produced from the nitrogenous constituents of the food, and that these were probably the chief if not the only source of the fat, even of Herbivora. In favor of the probability of this view, Prof. Voit refers to the formation of adipocere from nitrogenous substance: but he mainly relies upon the fact that, in experiments by Pettenkofer and himself in which large quantities of flesh were given to a dog, the whole of the nitrogen reappeared in the form of urea and in the fæces, whilst only a portion of the carbon was recovered in the urine, fæces, and the products of respiration and perspiration, from which it was concluded that some had been retained in the body, and had contributed to the formation of fat. That animals nevertheless do not become fat when fed upon very highly nitrogenous food, Voit considers sufficiently explained by the greater number of blood-corpuscles, the result of such diet, and the greatly increased activity of oxydation of nitrogenous substance under such conditions; whilst, on the other hand, the accumulation of fat when fat and carbon-hydrates are supplemented to a liberal nitrogenous diet, he considers to be connected with the much less active oxydation of the nitrogenous substance and fatty matter that then takes place, rather than attributable to the direct production of fat from the carbon-hydrates.

In the discussion which followed the reading of Professor Voit's paper, Baron Liebig forcibly called in question Professor Voit's conclusions, maintaining not only that it was inadmissible to form such conclusions on such a point in regard to Herbivora from the results of experiments made with Carnivora, but also that direct quantitative results obtained with herbivorous animals had afforded apparently conclusive evidence in favor of the opposite view.

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\* *Versuch-Stationen Organ.* vol. viii, No. 1, 1866 p. 23.

Since the Munich meeting, Herman Von Liebig, son of Baron Liebig, has written a paper on the subject\*, in which, admitting the probability that fat may be formed from nitrogenous substance, he nevertheless concludes that this is neither its only, nor even its chief source, in the ordinary feeding of Herbivora.

After referring to the leanness of the South Russian shepherds, who consume very large quantities of dried meat, and to the rotundity of the peasantry, especially the women, in districts where bread and fruits constitute the chief articles of food, H. Von Liebig proceeds to illustrate the formation of fat, from non-nitrogenous constituents of food by our domestic Herbivora, by the calculation of the results of numerous experiments made with cows in 1857, by Knop, Arendt, and Behr, in which the details as to food, live-weight, and quantity and composition of milk, were actually recorded. According to the mode of calculation adopted, it appeared that, after deducting from the amount of nitrogenous substance taken in the food, that estimated to be required by the system for other purposes, there was generally little or none remaining for the production of fat. In his calculations, however, H. Von Liebig, besides taking into account the probable amount of nitrogenous substance stored up in increase with gain of weight, or set at liberty when there was loss of weight, as the case might be, deducted from the amount of nitrogenous substance given in the food, not only that required for the production of the caseine of the milk, but also the whole of that estimated to be required for the mere sustenance of the animal (according to its weight), independently of gain or loss, or milk produced.

It is obvious, however, as pointed out by Voit, and as afterwards admitted by H. Von Liebig, that if nitrogenous substance may break up into urea and fat (with other products), the amount estimated to be required for the mere sustenance of the body should not be considered inadmissible for the formation of fat as one of its products, and therefore should not

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\* *Versuchs-Stationen Organ.* vol. viii. No. 3, 1866.



be deducted (with that appropriated for the production of increase and of the caseine of the milk) from the amount supplied in the food in estimating whether or not it provided sufficient for the formation of the fat known or calculated to be produced.

H. Von Liebig states that he selected experiments with cows as the basis of his illustrations, considering that, when in a normal state, the change in the solid substance of the body of the animal was comparatively small, if not, indeed, immaterial, and that the fixed products of the food, beyond what might be required for the mere maintenance of the body, were accumulated and easily estimated in the milk collected; whilst he considered, on the other hand, that the point in question could not be settled by reference to results relating to fattening animals, without the aid of an apparatus for the determination of the products of respiration and perspiration. We believe, however, that with a proper selection of fattening animals it may be satisfactorily illustrated without the aid of any such apparatus; and it is the object of this paper briefly to discuss the question of the sources of the fat of the animal body by reference to the results of experiments with such animals.

As already intimated, the objections of Dr. Hayden to the supposition that fat is formed from the carbon-hydrates of the food, were based upon physiological considerations of a qualitative, but not at all of a quantitative kind. Voit's argument was, on the other hand, founded upon strictly quantitative results, obtained, however, under conditions as to choice of animal and of food, in which the formation of fat, if it took place at all, must of necessity be attributed to the nitrogenous constituents consumed. H. Von Liebig also relied upon quantitative results as the basis of his illustrations; but those selected, when properly considered, afforded, to say the most, only negative evidence on the point.

The question arises: What description of animal is likely to yield the most direct and conclusive evidence as to the source

of the fat stored up in its body? Obviously the one which is fed more especially with a view to the production of fat, which consumes in its most appropriate fattening food a relatively large proportion of carbon-hydrates, and which yields a large proportion of fat, both in relation to the weight of animal within a given time, and to the amount of food consumed. The following table (I), which summarizes the results of a great many direct experiments of our own,\* will show that of the ox, the sheep and the pig—the most important of the animals fed and slaughtered as human food—the last pre-eminently supplies the required conditions.

TABLE I.—COMPARATIVE FATTENING QUALITIES OF DIFFERENT ANIMALS.

## Relation of parts in 100 live weight:

	OXEN.	SHEEP.	PIGS.
Average of,.....	16	249	59
Stomach and contents,.....	11.6	7.5	1.3
Intestines and contents,.....	2.7	3.6	6.2
	14.3	11.1	7.5

Heart, aorta, lungs, windpipe, liver, gall-bladder and contents, pancreas, spleen and blood,.....

7.0      7.3      6.6

## Per 100 live weight:

Dry substance consumed in food per week,.....	12.5	16.0	27.0
Increase yielded per week,.....	1.13	1.76	6.43

## Per 100 dry substance of food:

Total dry substance increase,.....	6.2	8.0	17.6
Fat in increase,.....	5.2	7.0	15.7
Total dry substance in urine and fæces,.....	36.5	31.9	16.7

## Average fat per cent.:

In lean condition,.....	16.0	18.0	22.0
In fat condition,.....	30.0	33.0	44.0
Increase whilst fattening,.....	60.0	65.0	70.0

Looking first to the comparative structure of the animals, so

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\* For the data upon which most of the average results given in the table are founded, see "Experimental Inquiry into the Composition of some of the Animals fed and slaughtered as Human Food," Phil. Trans. Part II, 1859. In the estimates given "per 100 live weight" and "per 100 dry substances of food," it is assumed that the oxen and sheep are liberally fed on oil-cake, clover chaff, and roots, and the pigs on barley meal alone; with different foods the results will, of course, be different

far as it may be considered characteristic or indicative of the description of the food, it is seen that, of stomach and contents, the ruminant ox has a much larger proportion than the ruminant sheep, and the ruminant sheep in its turn, much more than the non-ruminating pig. Consistently with these facts, we find that the ox consumes in its food a much larger proportion of only slowly digestible, or indigestible, cellulose than the sheep, and the sheep again very much more than the pig. The usual food of oxen and sheep, consisting as it does in large proportion of unripened or imperfectly ripened vegetable matter, is, in fact, essentially crude, containing not only a considerable amount of defectively elaborated and probably unassimilable nitrogenous substance, but also a large proportion of comparatively indigestible non-nitrogenous matter. Accordingly complexity and great capacity of stomach, and slow progress of the food through the organ, are characteristics of the structure and digestive process of the animals.

Of intestines and contents, on the other hand, the ox has a less proportion than the sheep, and the sheep considerably less than the pig.

In fact, the relatively very small proportion of stomach and contents, and relatively very large proportion of intestines and contents in the pig are very striking. But when we consider that his most appropriate fattening food consists of ripened seeds and highly starchy roots, containing little indigestible woody fibre, and their non-nitrogenous constituents almost wholly in the form of starch, the primary change of which is known to take place almost throughout the length of the intestinal canal, the reason of the relatively small proportion of stomach, and large proportion of intestines, seems to be at once apparent.

Passing from a consideration of the receptacles and, so to speak, first laboratories of the food, we will only remark, in reference to the remaining results given in the upper portion of the table, that of what may be called the further elaborating organs of the body, and their fluids—the heart, liver, lungs,

blood, &c.,—the proportion, taken in the aggregate, is strikingly similar in the three descriptions of animal.

The second division of the table shows that, notwithstanding its much larger proportion of stomach and contents, the ox consumes, for a given live weight within a given time, only about three-fourths as much dry substance of food as the sheep, and less than half as much as the pig, with its very small proportion of stomach and contents. The ox gives, too, in proportion to a given live weight within a given time, much less increase than the sheep, and only from one-fifth to one-sixth as much as the pig.

Reckoned in proportion to a given amount of dry substance of food consumed, the ox gives less both of total dry substance in increase, and of fat in increase, than the sheep, and only about one-third as much of either as the pig, whilst the ox voids of dry substance in fæces and urine the largest proportion, the sheep somewhat less, and the pig little more than half as much as the sheep, and less than half as much as the ox.

Lastly, the proportion of fat, whether reckoned in relation to the total weight of the body, or to the weight of the increase whilst fattening, is greater in the sheep than in the ox, and greater still in the pig.

Whilst referring to the connection between the weight and capacity of the stomach and the character of the food, it will not be without interest to call attention to the gradation in the proportion from the ox to the sheep, from the sheep to the pig, and from the pig to man. Below is given the approximate average proportion of stomach, by weight, in 100 live-weight of each.

Oxen, 3.19; sheep, 2.44; pigs, 0.88; man, 0.38.

Without assuming that relative weight represents with numerical exactitude relative capacity or size, we nevertheless cannot doubt that these figures have a very obvious significance. Thus, the ox consumes the largest proportion of difficultly digestible or indigestible woody fibre, the sheep less, the pig scarcely any, but a much larger proportion of comparatively

easily digestible starch, whilst man, within certain limits, the better he is fed the less does the non-nitrogenous portion of his food consist of starch, and the more of the much more highly concentrated alimentary substance fat, produced for him from much less concentrated vegetable food materials by the animals which he feeds for his own consumption.

From the facts which have been briefly stated, it will be obvious that, of the most important animals which we feed for human food, the pig offers many advantages as a subject for the consideration of the source in the food of the fat which he yields. Thus, for a given live weight he comprises a comparatively small proportion of alimentary organs and contents, and he consumes a large proportion of food, and yields a large proportion both of total increase and of fat, within a given time; his food is, as such, of a high character, yielding, compared with that of oxen or sheep, for a given weight of it much more total increase, much more fat, and much less excreted and necessarily effete matter; whilst his proportion of fat is the greatest, both in a given live weight and in his increase whilst fattening. It results that changes in his live weight are in a much less degree likely to be influenced by variation in the amount of the contents of the stomach and intestines, and are therefore much more direct indications of real increase of the substance of the body, and hence that there is much less probable range of error in calculating the amount and composition of the increase in live weight in relation to the amount and composition of the food consumed. In fact, from the very opposite character of the ruminant in these respects it is very much less appropriate for the purpose of estimating the sources in its food of the fat of its body. It is true that there is the advantage with the cow, that that important product of the food, the milk, is collected externally to the body, and hence its amount and composition can be easily determined, but the changes of weight of the animal itself, though comparatively small, are due to a greater variety of circumstances, and can, therefore, with less of certainty be properly interpreted than

even in the case of either the ox or the sheep. Indeed when experiments are conducted with cows or oxen, or even with sheep, for periods of a few weeks only, the variation in live weight may, in very great proportion, be due to variation in the contents of the alimentary organs merely.

The selection and calculation of results brought to view in Table II, will show that when experiments are conducted with pigs fed on good fattening food for periods of not less than eight or ten weeks, the amount both of total increase and of fat stored up are so great in proportion both to the original weight of the animal and to the food consumed, that the data so obtained may be safely relied upon as a means of estimating, with sufficient accuracy for the purpose of the present discussion, from what constituent or constituents of the food the fat of the animals has been derived.

*Experiment 1.*—In this experiment, two pigs of the same litter, of equal weight, and, as far as could be judged, of similar character, were selected. One was killed at once, and the amount of total dry or solid matter, nitrogenous substance, fat and mineral matter in its body determined. The other was then fed for a period of ten weeks on a good mixed food containing, however, a more than usual high proportion of nitrogenous substance. It was then weighed and killed, and its composition was determined as in the case of the other animal. The results so obtained supplied an important portion of the data requisite for the calculation of the composition of the increase in the other cases.\* The food consisted of a mixture of bean-meal, lentil-meal and bran, each one part, and barley meal three parts, given *ad libitum*.

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\* For further details relating to this and other experiments, we must refer to our former papers, as follows: "On the Composition of Foods in relation to Respiration and the Feeding of Animals," Report of the British Association for the Advancement of Science, for 1852. "Agricultural Chemistry, Pig Feeding," Journal Roy. Ag. Soc., England, vol. xiv., part 2, 1853. "On the Equivalency of Starch and Sugar in Food," Report of the British Association for 1854. "Experimental Inquiry into the Composition of some of the Animals Fed and Slaughtered as Human Food," Phil. Trans., part 2, 1859.

TABLE II.

*Relation of the total fat in the increase to the ready-formed fatty matter in the food, and of the carbon in the fat produced within the body to that of the nitrogenous substance consumed, in experiments with fattening pigs.*

CONDITIONS AND ACTUAL RESULTS OF EXPERIMENT.	EXPERIMENTS.									
	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	
Number of animals,.....	1	2	2	2	2	2	2	2	2	
Duration of experiment (weeks), .....	10	2	2	2	2	10	10	10	10	
Non-nitrogenous substance to one nitrogenous substance in food, .....	2.6	2.2	2.0	0.6	0.0	4.1	4.7	4.7	2.9	
Original live weight (lbs.), .....	102	429	449	431	442	225	221	221	223	
Final live-weight (lbs.), .....	191	685	742	652	720	532	532	552	604	
Increase in live-weight (lbs.),.....	89	256	293	221	291	242	242	272	212	
Increase on 100 original weight,.....	85.4	59.7	64.9	51.2	64.9	87.0	87.0	96.2	100.2	

CALCULATED FOR 100 INCREASE IN LIVE WEIGHT.

Fat, .....	68.1	78.9	69.6	79.0	71.2	64.1	63.9	62.0	59.9
{ Stored up in increase, .....									
Ready-formed in food, .....	16.6	20.4	11.2	26.3	12.4	7.9	7.9	7.3	6.6
Not ready-formed (produced), .....	47.5	58.5	58.4	52.7	58.8	56.2	56.0	54.7	53.3
Nitrogenous-substance, {									
{ Consumed in food, .....	100.0	107.0	128.0	87.6	64.0	81.0	81.0	74.0	82.0
Stored up in increase, .....	7.8	6.1	6.7	5.3	6.5	7.5	7.6	8.0	8.2
Not stored up (available for fat, &c.), .....	92.2	100.9	121.3	81.7	57.5	73.5	73.4	66.0	73.8
In "produced" fat, .....	86.6	41.2	45.0	40.6	45.3	43.3	43.1	42.1	41.0
In "available" nitrogenous substance minus urea, ....	44.0	43.1	63.6	24.7	27.4	35.1	35.0	31.5	35.2
Difference, .....	-7.4	-6.9	-17.6	15.9	17.9	8.2	8.1	10.6	5.6

CALCULATED FOR 100 CARBON IN ESTIMATED "PRODUCED" FAT.

Carbon, .....	120.2	116.7	129.1	60.8	60.5	61.1	61.2	74.5	85.9
{ In "available" nitrogenous substance minus urea, ...									
{ Not available from nitrogenous substance, .....	.....	.....	.....	39.2	39.5	18.9	18.8	26.2	14.1



*Experiments 2 and 3.*—In both these experiments, the proportion of nitrogenous substance in the food was very large; the relation of non-nitrogenous to one of nitrogenous substance being in Exp. 2 little more than half, and in Exp. 3 little more than one-third as much as usual in the recognized good fattening food of the animal. In Exp. 2 the food consisted of bran, bean and lentil meal, and Indian meal, each given separately, and *ad libitum*, and in Exp. 3 of an equal mixture of bean and lentil meal only, given *ad libitum*.

*Experiment 4 and 5.*—In Exp. 4 the food consisted of Indian meal only, and in Exp. 5 of barley meal only, in each case given *ad libitum*. Barley meal is undoubtedly the most approved staple fattening food of the pig, and the result was, that in both these experiments the proportion of non-nitrogenous to nitrogenous substance in the food was very nearly, though rather higher, the average in that which is recognized as the most appropriate fattening food of the animal.

*Experiments 6, 7, 8 and 9.*—The peculiarity of this series was that the food contained less ready formed fat than was the case in either of the other experiments, and that a large proportion of the non-nitrogenous substance supplied was in the form of either pure starch, pure sugar, or both. In Exps. 6, 7 and 8 a fixed quantity of lentil meal and bran (averaging nearly three and a quarter pounds lentil meal and about nine ounces bran) was given per head per day, and in addition, in Exp. 6, sugar, in Exp. 7, starch, and in Exp. 8, sugar and starch, each separately, *ad libitum*. In Exp. 9, lentil meal, bran, sugar and starch were each given separately, *ad libitum*.

The figures given in the Table show that the increase in weight was in no case less than 50, and in several nearly, and in one more than 100 per cent. upon the original weight of the animal, the amounts ranging from 51.3 to 8.9 per cent. when the experiment extended over eight, and from 85.4 to 106.8 per cent. when the experiment extended over ten weeks.

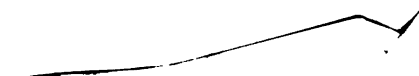
The determined or estimated amount of fat stored up in the increase was also in all cases very large, amounting to 63 per

cent. of the total increase in Exp. 1, in which it was experimentally determined, and calculated to be even more than this in several of the other cases. The tendency to error in the calculations would, however, be to give the proportion too low in Exps. 6, 7, 8 and 9, which were conducted over a period of ten weeks, and in which the proportion of increase upon the original weight was very high, and to give it too high in Exps. 2, 3, 4 and 5, conducted only over eight weeks, but more especially in Exps. 2 and 4, in which the proportion of increase upon the original weight was comparatively small. The range of the probable error of calculation here indicated is, however, not such as in any degree to throw doubt upon the validity of any conclusions which will be drawn from the indications of the figures as they stand.

It is seen that, of the determined or estimated total fat stored up in the increase, the proportion which could possibly have been derived from the ready formed fat of the food, even supposing the whole of that supplied had been assimilated, was so small as to leave no doubt whatever that a very large proportion of the stored up fat must have been produced from other constituents than the ready formed fatty matter of the food. According to the figures given in the table, the proportion of fat which must have been so produced, ranged from about two-thirds to about eight-ninths of the total amount stored up.

Assuming it then to be established beyond doubt that there was a very large formation of fat within the body from other constituents than the fatty matter of the food, the questions arise whether this large amount of produced fat could possibly have been derived from the nitrogenous constituents of the food, or whether it must of necessity have had its source, in greater or less proportion, in the carbon-hydrates at the same time supplied? The results adduced afford conclusive evidence on this point also.

The figures show that, after deducting from the total amount of nitrogenous substance consumed for the production of 100 pounds of increase in live weight the small amount estimated



to be stored up in the increase, there remains a very large proportion available, it may be for the production of fat with other products.

If we next compare the amount of carbon in the estimated *produced fat* with the amount contained in the nitrogenous substance of the food not stored up as increase, minus that contained in the urea, which would be one of the final products of the breaking up of this nitrogenous substance (or its equivalent given off), the result shows in some cases an excess, and in others a deficiency, of carbon possibly available from the nitrogenous constituents of the food, compared with that required for the formation of the fat estimated to be derived from the other constituents than the ready formed fat in the food.

Reckoned to the standard of 100 carbon in the estimated produced fat, it will be seen, as shown in the bottom lines of the table, that in Exps. 1, 2 and 3, in which the proportion of non-nitrogenous to nitrogenous substance in the food was (especially in Exp. 3) considerably less than in such food as experience has shown to be the most appropriate in the fattening of the pig,—that is to say, in which the nitrogenous substance was in considerable excess over the amount and proportion usually supplied—there was, according to the calculation, more than sufficient carbon possibly available from the nitrogenous substance of the food, for the formation of the fat estimated to be produced.

In Exps. 4 and 5, however, in which the relation of the non-nitrogenous to the nitrogenous substance in the food was much more nearly that in the usual food of the well-fed fattening pig, it is reckoned that there was about 40 per cent. of the carbon of the produced fat which could not possibly have been supplied from the nitrogenous constituents of the food.

In the other experiments (Nos. 6, 7, 8 and 9), in which again the proportion of the non-nitrogenous to the nitrogenous constituents of the food was lower than usual (though not so much so as in Exps. 1, 2 and 3)—in which, in fact, the nitrogenous constituents were in excess—there was still a considerable pro-

portion of the carbon of the produced fat which the nitrogenous constituents of the food could not possibly have supplied.

It is hardly necessary to point out that, according to the mode of illustration we have adopted, the figures show not only the utmost proportion of the carbon of the stored-up fat which could possibly have had its source in the nitrogenous substance of the food, but even notably more than could possibly have been so derived. Thus, to say nothing of other considerations, it has been assumed for simplicity of illustration, and granted for the sake of argument, that the whole of the ready-formed fatty matter of the food contributed to the fat stored up, that the whole of the nitrogenous substance of the food not stored up as increase would be perfectly digested and become available for the purposes of the system, and that in the breaking up of the nitrogenous substance for the formation of fat, no other carbon compounds than fat and urea would be produced. It is obvious, however, that these assumptions are in part improbable, and in part quite inadmissible, and that the tendency of each of them is to show too large a proportion of the produced fat to have been possibly derived from the nitrogenous constituents of the food.

The amount of fat necessarily derived from other sources than the nitrogenous constituents of the food must therefore be greater than our mode of estimate can indicate; and it is obvious, from the figures given in the table, that the less the excess of nitrogenous substance in the food, the greater was the proportion of produced fat which must necessarily have had its source in the carbon-hydrates of the food, and that, at any rate, in those cases in which the proportion of non-nitrogenous to nitrogenous constituents supplied was the more nearly that occurring in the admittedly most appropriate fattening food of the animal, the proportion of the fat which must necessarily have been derived from the carbon-hydrates was very large, even allowing all that was possible to have been produced from the nitrogenous substance of the food.

That, nevertheless, fat may be produced in the animal body at the expense of nitrogenous substance, in greater or less degree according to the character of the animal and of the food, not only chemical and physiological considerations, but direct experimental evidence would lead us to conclude. Indeed we have, in former papers already referred to, called attention to the fact that the results of our experiments with fattening animals, when carefully considered, afford evidence in favor of such a conclusion. To discuss the point satisfactorily on the present occasion, by the aid of figures, would, however, unduly extend the limits of our paper.

But, as indicating the bearing of the results referred to, it may be stated, in passing, that in numerous cases, otherwise comparable, but in which the amount and proportion of the nitrogenous constituents consumed varied very greatly, the results clearly showed that neither the amount of food consumed, nor the amount of increase in live-weight produced, bore any direct relation to the amount of nitrogenous substance supplied. On the other hand, both the amount of food consumed and the amount of increase produced bore a very close relation to the supply of digestible non-nitrogenous constituents, and even a closer relation still to the amount of total digestible dry organic substance (that is, nitrogenous and non-nitrogenous taken together); whilst, so far as could be judged from careful observation, the proportion of nitrogenous to non-nitrogenous substance (fat) in the increase did not vary in anything like a corresponding degree with the variation in the proportion of the nitrogenous and non-nitrogenous constituents in the food. The animals consuming excessive amounts of nitrogenous substance did, indeed, show a greater tendency to increase in frame and flesh; but they, nevertheless, became fat. It would appear that the excess of nitrogenous substance had acted vicariously in defect of a greater supply of the non-nitrogenous constituents, contributing material not only to meet the respiratory exigencies of the animal, but also for the production of fat.

The main conclusions in regard to the sources of the fat of the animal body to which the evidence adduced has led, may be briefly stated as follows:

1. That certainly a large proportion of the fat of the herbivora fattened for human food, must be derived from other substances than fatty matter in the food.
2. That when fattening animals are fed upon their most appropriate food, much of their stored-up fat must be produced from the carbon-hydrates it supplies.
3. That nitrogenous substance may also serve as a source of fat, more especially when it is in excess and the supply of available non-nitrogenous constituents is relatively defective.



# FOOD:

## ITS RELATIONS TO VARIOUS EXIGENCIES OF THE ANIMAL BODY.

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BY J. B. LAWES AND J. H. GILBERT.

The appearance in the June (supplementary) number of the *Philosophical Magazine* of the interesting paper by Professors Fick and Wislicenus, "On the Origin of Muscular Power," and the further interest excited in the subject by Professor Frankland's recent lecture at the Royal Institution, seem to render it opportune that the important question of the connection between certain constituents of food and certain exigencies of the animal body should receive a little further consideration at the present time. Professor Frankland truly said that, since the appearance of Baron Liebig's masterly and highly suggestive work "On Organic Chemistry in its applications to Physiology and Pathology" in 1842, his views of the relation of the nitrogenous and the non-nitrogenous constituents of food to certain requirements of the animal organism, have been pretty generally adopted by text-book writers. It is also true that authorities on the subject of the chemistry of food have, even so recently as last year and this, either directly maintained or taken for granted the correctness of Baron Liebig's views. It is, however, not the case, as was also assumed by Professor Frankland, that those views have remained unquestioned excepting in the one or two instances of criticism to which he referred.



This question, in various aspects, has occupied a great deal of our own attention for many years past; and so long ago as 1852 we advocated substantially the views now adopted by Professors Fick, Wislicenus, and Frankland; and we have on various occasions since that date expressed them with greater definiteness, and urged them the more emphatically, as new experimental evidence either of others or ourselves seemed to lend them support or confirmation. It may be well, therefore, to state very briefly the course of our investigations bearing upon the subject, and also the conclusions that we have based upon them.

In Baron Liebig's work above alluded to, and also in subsequent publications, he treated of the food requirements of the animal body generally—that is, under different conditions; and starting from the fundamental assumptions on the one hand, of the direct connection of the nitrogenous or, as he designated them, the "*plastic*" constituents of food, not only with the formation in the animal body of the compounds containing nitrogen, but also with the development of muscular power, and, on the other, of the general relationship of the non-nitrogenous constituents of food with respiration, the development of heat, and the deposition of animal fat, he concluded that the relative value of different foods, as such, was to a great extent dependent on, and even measurable by, the proportion of nitrogenous constituents which they contained.

It was upon the assumption of the broad and fundamental classification of the constituents of food according to their various offices in the animal economy, as above stated, that numerous analyses of food were undertaken, and founded upon the results obtained. Tables constructed professing to arrange current articles of food, both of man and other animals, according to their comparative values as such; and whether the object were the feeding of animals for the production of milk, the so-called fattening of them for the production of meat, or the support of the body for the exercise of muscular power,

the proportion of nitrogenous constituents was generally taken as the measure of that value.

Omitting, for the sake of brevity, any special reference to the labors or views of others, it will suffice here to make a few such quotations from Baron Liebig's work as will best convey shortly in his own words a pretty clear indication of his own views, and at the same time pretty fairly represent those of a large proportion both of systematic writers and experimenters, on the points in question. Speaking of the nitrogenous constituents of food, he said:

"It is found that animals require for their support less of any vegetable food in proportion as it is richer in these peculiar matters, and cannot be nourished by vegetables in which these matters are absent." (Chemical Letters, 3d edition, p. 349.)

Again:

"The admirable experiments of Boussingault prove, that the increase in the weight of the body in the fattening or feeding of stock (just as is the case with the supply of milk obtained from milch cows), is in proportion to the amount of plastic constituents in the daily supply of fodder." (Chemical Letters, 3d edition, p. 369.)

In regard to the exercise of force, he said:

"As an immediate effect of the manifestation of mechanical force, we see that a part of the muscular substance loses its vital properties, its character of life; that this portion separates from the living part, and loses its capacity of growth and its power of resistance. We find that this change of properties is accompanied by the entrance of a foreign body (oxygen) into the composition of the muscular fiber (just as the acid lost its chemical character by combining with zinc); and all experience proves that this conversion of living muscular fiber into compounds destitute of vitality is accelerated or retarded, according to the amount of force employed to produce motion.

Nay, it may safely be affirmed that they are mutually proportional; that a rapid transformation of muscular fiber, or, as it may be called, a rapid change of matter, determines a greater amount of mechanical force; and conversely, that a greater amount of mechanical motion (of mechanical force expended in motion) determines a more rapid change of matter." (*Organic Chemistry in its application to Physiology and Pathology*, 1842, pp. 220 and 221.)

And again:

"The amount of azotized food necessary to restore the equilibrium between waste and supply, is directly proportional to the amount of tissues metamorphosed.

"The amount of living matter, which in the body loses the condition of life, is, in equal temperature, directly proportional to the mechanical effects produced in a given time.

"The amount of tissue metamorphosed in a given time may be measured by the quantity of nitrogen in the urine.

"The sum of the mechanical effects produced in two individuals in the same temperature, is proportional to the amount of nitrogen in their urine, whether the mechanical force has been employed in voluntary or involuntary motions, whether it has been consumed by the limbs or by the heart and other viscera." (*Ibid*, p. 245.)

Our own direct experiments have had reference chiefly to the feeding of fattening animals; but the characteristic food requirements of the body, when fed with the view to the exercise of muscular power, have also been made the subjects of inquiry.

Referring to the feeding of fattening animals, the question arises whether in the use of the currently adopted food stuffs, *the amount of food consumed by a given weight of animal within a given time, and the amount of increase produced*, are more influenced by the amount of the nitrogenous or the non-nitrogenous constituents which the food supplies; that is to say, whether the sum of the requirements of the animal system,

under these circumstances, is such that, in the use of the ordinary articles of food, the *amount taken or increase produced* will be more regulated, or measurable, by the supplies of the nitrogenous or "flesh-forming" constituents, or by those of the more specially respiratory and fat-forming non-nitrogenous constituents.

To acquire the data necessary for the satisfactory solution of this question, some hundreds of animals (oxen, sheep and pigs) have been experimented upon. Comparative lots being selected, the general plan of the feeding experiments was to give some a fixed and limited amount of food of known composition in regard to its contents of nitrogenous and non-nitrogenous constituents; to others, a fixed and limited amount of food of different composition in this respect, and to allow all to take as much as they chose to eat of some other food, also of known composition, the quantity consumed being weighed. In some cases a single description of food only, or a mixture of several descriptions in known proportions, was given *ad libitum*, but weighed; and in others, several descriptions of food were allowed, each separately, *ad libitum*, but weighed. It will be seen that in this way great variation in the amount and proportion of the nitrogenous and non-nitrogenous constituents supplied was attained, whilst the animals, according to the nature of the food within their reach, fixed for themselves the limit of their consumption. All such comparative experiments were conducted for many weeks, or even for several months, consecutively, and the weights of the animals themselves were determined at the commencement, at stated periods during the progress and at the conclusion of the experiment.\*

To determine the character and composition of the gross

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\* "On the composition of Foods in relation to Respiration and the Feeding of Animals," Report of the British Association for the Advancement of Science, for 1852. "Agricultural Chemistry; Sheep-feeding and Manure," part 1, Journal Roy. Ag. Soc., England, vol. x, part 1, 1860. "Reports of Experiments on the Comparative Fattening Qualities of different Breeds of Sheep," *Ibid*, vol. xii, part 2, 1862; vol. xvi, part 1, 1868. "Agricultural Chemistry, Pig Feeding," *Ibid*, vol. xiv, part 2, 1858. "On the equivalency of Starch and Sugar in Food," Rep. Brit. Assoc., for 1854.

increase in live weight, the weights of the individual internal organs and of other separated parts of several hundred animals of different descriptions and in different conditions as to age, maturity and fatness were taken; whilst in some carefully selected cases the total amounts of fat, nitrogenous substance, mineral matter and water were determined.\*

It is obvious that in the case of fattening animals, the amount of food consumed in relation to a given body-weight within a given time will be regulated, not only by the demands of the system for the support of respiration, perspiration, &c., and for the repair of normal waste of nitrogenous substance, but also by the additional requirements for growth and increase; whilst, on the other hand, the amount required to be consumed for the production of a given amount of increase will, in its turn, include that due to the demands of the system for respirable and perspirable matter and the repair of the waste of nitrogenous substance. Whether, however, the experimental results were calculated so as to show the amount consumed per 100 lbs. live-weight per week, or to produce 100 lbs. increase in live-weight, it was strikingly brought out in all comparable experiments that it was in neither case the amount of nitrogenous constituents, but in both the amount of digestible or available non-nitrogenous (or total organic) substance of the food that had regulated the result obtained.

Referring the reader to our former papers for all experimental details, and for the fuller discussion of the results and statement of our conclusions, we will close this part of the subject in words quoted from a paper given at the meeting of the British Association at Belfast, in 1852.† The sentence as quoted had reference to the results obtained with sheep; but

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\* "Experimental Inquiry into the Composition of some of the Animals Fed and Slaughtered as Human Food," Phil. Trans., part 2, 1850; also Proceedings of the Royal Society, vol. ix. p. 348. "On the Composition of Oxen, Sheep and Pigs, and of their Increase whilst Fattening," Journ. Roy. Ag. Soc., England, vol. xxi, part 2, 1860. "On the Chemistry of the Feeding of Animals for the production of Meat and Manure," Proc. Roy. Dub. Soc., March 31, 1864.

† "On the Composition of Foods in relation to Respiration and the Feeding of Animals," Report of the British Association for the Advancement of Science for 1852.

subsequently those obtained with pigs were summarized in almost the same words:

"\* \* \* \* If we consider that it is the results obtained under the subtle agency of animal life that we are seeking to measure and express in figures, and if we also bear in mind the various sources of modification to which our actual figures must be submitted in order to attain their true indications, we think that it cannot be doubted that, beyond a limit which few, if any, of our current fattening food-stuffs are found to go, it is their available non-nitrogenous constituents, rather than their richness in the nitrogenous ones, that measure both the amount consumed to a given weight of animal, within a given time, and the increase in weight obtained."

Bearing in mind the nature of the respiratory process, and the great influence which its demands must necessarily exercise over the amount of food consumed, it will scarcely appear surprising that *consumption* at least should be chiefly regulated by the supply in the food of non-nitrogenous constituents; but that *the amount of increase* obtained in feeding animals for the butcher should also bear a closer relationship to the supply of the non-nitrogenous than to that of the nitrogenous constituents might perhaps well be looked upon as inconsistent with the currently adopted views as to the highly nitrogenous character of the increase of animals fed for human food, and, indeed, of the highly nitrogenous character of the animal portion of human food generally.

The investigation into the composition of the fattening animals, and their increase, above alluded to, showed, however, how small was the proportion of the nitrogenous substance of the food that was stored up in the increase of the animal, and also that the proportion of fat in the increase was much greater than had previously been supposed. The results further led to the remarkable conclusion, that, reckoning the fat of the estimated total consumed portions of animals admitted to be in only a proper condition of fatness into its starch equivalent, there was, on the average, a higher proportion of so-reckoned

non-nitrogenous substance to one of nitrogenous substance in such animal food than in bread itself. It was concluded, indeed, that, on the large scale, the introduction of animal aliments into our otherwise chiefly farinaceous diet did not increase, but diminish the *relation* of the nitrogenous or so-called "flesh-forming," to the non-nitrogenous constituents, (reckoned according to their respiratory and fat-forming capacity) in the collective food. The important bearing of these facts in forming an estimate of the characteristics of different human dietaries will be at once apparent.

So much, then, for the characteristic food requirements of animals exposed to as little exertion as possible, and fed with the express view of accumulating flesh and fat in their bodies. Concurrently with the earlier experiments to determine the relations of food and body-weight and increase above referred to, the question of the relation of the amount of the constituents voided (especially the nitrogen) in the liquid and solid excrements to that in the food consumed, was also investigated. Consistently with the results obtained in regard to the amount and character of the increase resulting from the consumption of very different amounts of nitrogenous substance, it was found that the amount of nitrogen voided by fattening animals fed under equal conditions as to the exercise of force, bore a very direct relation to that supplied in the food. So direct, indeed, is the connection between the composition of the matters excreted and that of the food consumed, that we have constructed tables showing the relative value of the manure produced by fattening animals from a given weight of different food-stuffs, according to the composition of the latter.

But more to our present purpose—so striking were the results obtained in regard to the connection between the composition of the food on the one hand, and the amount consumed, the amount and character of the increase produced, and the composition of the excreted matters, on the other, and, on some important points, so contrary in their indications to the prevailing views, that we were led at once to turn our atten-

tion to human dietaries, and especially to a consideration of the management of the animal body undergoing somewhat excessive labor, as, for instance, the hunting-horse, the racer, the cab-horse, and the fox-hound, and also pugilists and runners. The conclusions to which we were led by this study were briefly summarized in 1852 as follows:\*

"\* \* \* \* \* That in the cases, at least of ordinary exercise of force, the exigencies of the respiratory system keep pace more nearly with the demand for nitrogenous constituents of food than is usually supposed;"

And further:

"A somewhat concentrated supply of nitrogen, does, however, in some cases, seem to be required when the system is over-taxed; as for instance, when day by day, more labor is demanded of the animal body than it is competent, without deterioration, to keep up; and perhaps also, in the human body, when under excitement or excessive mental exercise. It must be remembered, however, that it is in butchers' meat, to which is attributed such high flesh-forming capacity, that we have also, in the fat which it contains, a large proportion of respiratory material of the most concentrated kind. It is found, too, that of the dry substance of the *egg*, 40 per cent. is pure fat.

"A consideration of the habits of those of the laboring classes who are under, rather than over fed, will show, that they first have recourse to fat meat, such as pork, rather than to those which are leaner and more nitrogenous; thus, perhaps, indicating that the first instinctive call is for an increase of the respiratory constituents of food. It cannot be doubted, however, that the higher classes do consume a larger proportion of the leaner meats; though it is probable, as we have said, that even with these as well as pork, more *fat*, possessing a higher respiratory capacity than any other constituent of food, is taken into the system than is generally imagined. Fat and butter, indeed, may be said to have about twice and a-half the respi-

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\* Report of the British Association for the Advancement of Science for 1852.



ratory capacity of starch, sugar, &c. It should be remembered, too, that the classes which consume most of the leaner meats, are also those which consume the most butter, sugar, and in many cases, alcoholic drinks also.

"It is further worthy of remark, that whenever labor is expended in the manufacture of staple articles of food, it has generally for its object the concentration of the *non-nitrogenous*, or more peculiarly respiratory constituents. Sugar, butter, and alcoholic drinks are notable instances of this. Cheese, which at first sight might appear an exception, is in reality not so; for those cheeses which bring the highest price are always those which contain the most butter; whilst butter itself is always dearer than cheese.

"In conclusion, it must by no means be understood that we would in any way depreciate the value of even a somewhat liberal amount of nitrogen in food. We believe, however, that on the current views too high a relative importance is attached to it, and that it would conduce to the further progress in this most important field of inquiry if the prevailing opinions on the subject were somewhat modified."\*

It will be borne in mind that at the time the statement of views here quoted was made, the opinions expressed were directly contrary to all recognized authority on the subject, and it is since that date that so much evidence has been accumulated in regard to the amounts of urea, and the amounts of carbonic acid and other products, given off under varied conditions as to food and exercise. Still, from the facts even then at command, it was concluded that the increased demand for food, resulting from the exercise of muscular power, was specially characterized by the requirement for an enhanced amount of the *non-nitrogenous* constituents. Confirmatory evidence was, however, not long wanting.

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\* It is worthy of remark, too, that neither are the most highly nitrogenous wheats the most valued by the baker for the purposes of bread-making, nor is the most highly nitrogenous bread the most valued by the chiefly bread-fed working man. See "On some points in the Composition of Wheat-grain, its Products in the Mill, and Bread," Journ. Chem. Soc., vol. x., 1858.

In 1854 we selected two pigs as nearly as possible of equal weight and character; to one was given *ad libitum*, lentil meal (containing about 4 per cent. nitrogen), and to the other, also *ad libitum*, barley meal (containing less than 2 per cent.) After the animals had been kept for a certain time on their respective foods, one comparative experiment was conducted for a period of three days, and another for a period of ten days. The weights of the animals were taken at the beginning and at the end of each experiment, and besides other particulars, the amounts of nitrogen consumed in food and voided as urea, were determined.\* The result was, that with exactly equal conditions as to exercise, both animals being in fact at rest, the amount of urea passed by the one feeding on the highly nitrogenous lentil meal was more than twice as great as that passed by the one fed on the barley meal. We have since made other such experiments with similar results.

It was clear, therefore, that the rule laid down by Liebig, and assumed to be substantially correct by so many writers, did not hold good—namely, that “The sum of the mechanical effects produced in two individuals, in the same temperature, is proportional to the amount of nitrogen in their urine; whether the mechanical force has been employed in voluntary or involuntary motions, whether it has been consumed by the limbs or by the heart and other viscera”—unless, indeed, as has been assumed by some experimenters, there is, with increased nitrogen in the food, an increased amount of mechanical force employed in the “involuntary motions” sufficient to account for the increased amount of urea voided.

It was at any rate obvious that, if the amount of urea voided by one animal at rest could be from two to three times as great as that voided by a similar animal also at rest, and under otherwise equal conditions, provided only that the food of the one contained from two to three times as much nitrogen as that of the other, the amount of urea passed could not be any measure of the amount of muscular power exerted; and this

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\* Phil. Trans., part 2, 1850, p. 554.

evidence, considered in connection with that relating to the demands of the system not only of the fattening animal but of the animal body fed with a view to mechanical exertion, afforded further confirmation of the view we had already put forward as above quoted, and also led to the extension and more definite expression of it.

The results of Bischoff and Voit, conducted through a period of many months, with a dog, either submitted to hunger or fed from time to time on foods containing very different amounts of nitrogenous substance, showed a very variable amount of urea voided, although the animal was kept under equal conditions as to exercise. Still, on the publication of those results in 1860, the authors assumed that although there had been no greater exercise of force manifested in the form of external work, yet when the amount of nitrogenous substance in the food was greater, and the amount of urea voided correspondingly greater, there must have been a corresponding increase in the force exercised in the conduct of the actions proceeding within the body itself in connection with the disposition of the increased amount of nitrogenous substance consumed. When, however, they subsequently found that the amount of urea passed by the animal when subjected to somewhat severe labor was, other things being equal, no greater than when at rest, whilst the carbonic acid evolved was much increased by such exercise, their view was, of necessity, somewhat modified.

Again, the results of Dr. Edward Smith, which showed great variation in the amount of urea passed when there was concurrent variation in the amount of nitrogenous substance in the food, and comparatively little variation in the amount of urea voided with great variation in the amount of labor performed, but, on the other hand, great increase in the carbonic acid evolved with increased exercise of force, obviously still further pointed to the correctness of the view that with muscular exertion there was a more marked increased demand for the non-nitrogenous than for the nitrogenous constituents of food.

That this was the necessary conclusion from the results of our

own investigations, and also from those of the researches of Bidder and Schmidt, Bischoff, Voit, Pettenkofer, E. Smith, and others, we have frequently maintained. Indeed, the view urged in public discussion has been, that all the evidence at command tended to show that by an increased exercise of muscular power there was, with increased requirement for respirable material, probably no increased production and avoidance of urea, unless, owing to excess of nitrogenous matter in the food, or a deficiency of available non-nitrogenous substance, or diseased action, the nitrogenous constituents of the fluids or solids of the body were drawn upon in an abnormal degree for the supply of respirable material.

From the facts briefly summarized in the foregoing pages, it will be obvious that the generally accepted views in regard to the adaptation of food, according to its composition, to the various exigencies of the animal body, require modification in other respects than in so far as they relate to the source or development of muscular power alone. At the same time we hail with much satisfaction the confirmation of the views we have so long maintained on the point in opposition to general authority, which has recently been afforded by the results of the interesting, though limited experiments of Professors Fick and Wislicenus, so ably discussed by them in their paper, and by Professor Frankland in his lecture.



## DISEASES OF CATTLE.

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[From Prof. John Gamgee's work, "Dairy Stock."]

### **SPLENIC APOPLEXY.**

A blood disease incidental to the plethoric state, in which apoplexy and rupture of the spleen occur. I first observed this affection in the cows of the Duke of Tuscany, in 1851. It has long been known on the Continent, and in France it has claimed considerable attention. It is there named "*Maladie de sang*"—blood disease—and under that name Professor Delafond has published a most elaborate work. I have observed the disease in feeding-stock in Northumberland, and have received accounts of the malady from Aberdeenshire, and various other counties of England and Scotland. I may here reproduce a short statement regarding it, published by me in the *Edinburgh Veterinary Review*, vol. 1, page 488.

The disease broke out in the winter of 1857-58, on a farm characterized by extreme richness of soil, in the north of Northumberland. In the month of January, 1859, it reappeared, and did not cease until twenty-three head of cattle had been seized.

Splenic apoplexy is a malady that has hitherto been observed in the north of Britain, and its recurrence recently is evidently to be attributed to the special method of high farming and feeding stock where it has for the last two years proved so destructive.

The country above referred to is a peculiarly dry and healthy one. About 300 head of cattle are annually fattened

on it. One lot made ready at Christmas, and sold as fat beef in Newcastle; a second lot kept rather back till January, when they are allowed an abundance of turnips, especially Swedes, meal, and the best oat straw. The cattle affected are three-year-olds; and it would appear that those fed on the Swedish turnips, especially from the field, have suffered most; but some fed on yellow or white turnips have been affected, and we would regard the meal, and perhaps the oat straw, as more likely to have produced the disorder. According to Delafond's researches, leguminosæ or forages very rich in nutritive principles and deficient in water, are frequent causes of splenic apoplexy. The farmer in Northumberland suspected the artificial manures last year, and therefore dressed his land chiefly with home manure; but the properties of the last crop have proved as deleterious as those of the preceding one.

The malady stopped suddenly about the middle of February, and this was probably due to the cattle suffering only when the system was taxed by change from rather moderate to very high feeding. It is an interesting fact, that, in cows, the disorder only affects those which are approaching the period when the secretion of milk is stopped, and when there is a tendency to lay on flesh. Being liable to plethora, cows fed on food capable of producing splenic apoplexy, die from it. Change of diet proved of no avail, at the farm above referred to, and common salt had been recommended as a preventative. But, as Delafond has shown, it is not a remedy in such cases; rather the reverse, and thus it proved in the above instance. The malady stopped spontaneously, and the point now to settle is the prevention of the disease during future seasons.

In splenic apoplexy there are no premonitory signs—the animals apparently enjoying the best health early in the morning, may be dead sometimes before noon. Occasionally there are symptoms of excitement—the eyes are prominent, and the visible mucous membrane injected. Uneasiness suddenly manifests itself, and colicky pains indicate abdominal disorder. The urine voided is high colored and red, and there may also be

blood in the fæces. The back becomes arched, and the animal fixes itself to anything to which it may be tied in a stall, or by pressing back into a corner of the shed in which it may be. The pulse is quick and hard, then feeble and small—the breathing is accelerated and short. The animal soon drops, and is seized with convulsive twitchings. In addition to the discharge of fæces and urine tinged with blood, there is a red, frothy liquid which escapes from the nostrils; the animal bellows, moans, and soon dies.

The duration of the disease varies from four to twenty-four hours. If the animals have been bled very early, they are not cured, nor can the disease be prevented by bleeding, but life may be prolonged. It would appear that an animal seized with splenic apoplexy dies quicker if left quiet, than if assisted by a drive or a journey, per train; and the farmer who has sustained the above serious losses, has never known an animal to die in a railway train, though it may have been moved from the farm where seized, and detained for several hours on the journey.

*Post mortem appearances.*—The skin being removed, it is obvious from the turgid state of the blood-vessels, that a great accumulation of blood has occurred in the system. Blood extravasations are seen in many parts—on the serous membranes in the form of ecchymoses, in the lungs, liver, and other vascular organs, but more especially the spleen. The latter organ is found enormously enlarged and distended by semi-coagulated blood, which has burst from its delicate vessels. Not unfrequently the spleen is found ruptured, and the blood discharged into the abdomen.

In addition to the above I have only to say, that the treatment laid down for *plethora* again holds good, and should be followed out. With improvements in agriculture new diseases are produced, and dairymen may expect a spread of this fatal malady. Fortunately its prevention is quite possible, particularly by moderating the diet.



## GLOEANTHRAX, OR BLAIN.

This is a common disease amongst dairy stock in Britain, especially since the days of thorough land drainage. It is very common in Italy and France. A few years ago it was very rife in Aberdeenshire, and proved destructive. It is closely allied to Black Quarter [or Black Leg], and though the tongue is the seat of the local manifestations, the malady is constitutional, and is distinguished by a blood poison.

It is a contagious disease, though developing spontaneously under the combined influences of heat, moisture, and putrefactive emanations from the soil. Little more definite knowledge exists regarding its causes.

*Symptoms.*—A cow refuses food, is observed languid, with saliva flowing freely from the mouth, and if food be grasped with the lips she is unable to chew it, the tongue being rendered almost motionless from pain. The animal becomes very rapidly worse, the lips swell, the cheeks and neck swell, breathing becomes very labored, suffocation threatens, and the discharge from the mouth becomes offensive, tinged with blood, and of a greenish color. The tongue, which is swollen and raised, is at first covered with vesicles, which exist also on the lips and gums, and which enlarge rapidly, become opaque, filled with matter, and ultimately burst or are broken, leaving behind a sloughy and ulcerating surface. The typhus and constitutional symptoms are very severe, and the animal dies in from twenty-four hours to three days.

*Treatment.*—Locally the vesicles must be opened, and the mouth freely and repeatedly washed with chlorine water, or vinegar and water. A strong purgative should be given, and if the local ulceration be severe, active caustics, such as nitrate of silver, should be applied. Many cases need support with wine, beer, and mineral acids.

## EPIZOOTIC APHTHA—THE MURRAIN.

This disease commonly known in Scotland as the murrain, and in England as the epidemic, or foot and mouth disease, is

very troublesome in the dairy, and even fatal where calves are reared. It is a vesicular eruption in the mouth, on the teats and on the feet. Professor Simonds has named it epizootic eczema. It affects all warm-blooded animals.

*Causes.*—Contagion induces the spread of the malady, and not only does it extend from cow to cow, but to all other animals approaching those diseased. The saliva from the mouths of suffering cattle, may infect a large quantity of food and render it injurious to other quadrupeds, and in milking a cow with vesicles on the teats, the poison becomes mixed with the milk, and if drunk warm by human beings will not only produce inflammation of the throat, but also eruptions of the skin. I have known calves and pigs to die when fed on the milk of affected cows.

*Symptoms.*—On the introduction of a newly-bought cow into a herd, it is found that her teats are sore, or she is slightly lame, or she experiences difficulty in feeding, from irritation of the mouth. On one or all these parts when examined, an eruption is observed, consisting in many vesicles, raised on the inflamed membrane or skin. The vesicles, if not broken, become filled with pus, and sometimes dry, a scab forming. More commonly the irritant discharge excites inflammation, and a raw, sore surface is the result. Affecting either the mouth or the teats, the local symptoms gradually subside, and the disease disappears; but when the feet are affected, unless great attention be paid early, the discharge burrows between the hoofs and the vascular structures, causing a separation of the horn, which is in the course of time thrown off. A new hoof develops again in all cases in which the structure of the foot has been carefully protected. The constitutional symptoms in this disease are occasionally very severe, and a row of cows may be seen lying in great pain, breathing heavily, with a rapid pulse, feeding but little if at all, and visibly wasting. It is from loss in the condition of cows, and diminution in the quantity of milk, so long as the disease lasts, that the dairy-keeper suffers.

*Treatment.*—A mild purge may be given to the affected ani-

mals, but the attention must chiefly be paid to the local irruption, and either of the following lotions may be used:

Chlorine water, 1 pint; water 12 pints. Mix and use freely to affected parts; or

Sulphate of zinc, 2 drachms; water, 1 pint, or a solution of alum, etc.

Vinegar and water, or water acidulated with sulphuric or hydrochloric acid may be employed.

*Prevention.*—From the certainty that all the cows will take the disease, and that the longer it hangs about a place the worse for the owner of stock, I have usually recommended to communicate the disease to all the animals at once by inoculation. It is readily controlled by judicious treatment and nursing, and in a week or two all the cows are free from the disease, and only slightly susceptible of a second attack. Recently, considerable discussion has gone on in France as to the recurrence of the malady in animals that have been once affected, and the weight of evidence is in favor of the repeated seizure of them by the affection.

*Calves*, if attacked by inflammation of the throat from drinking the milk, are very likely to die. They evince great difficulty in swallowing; sometimes cough, and saliva drops in large quantities from the irritated mouth; the whole alimentary canal may be affected, attended by much irritation—fever. They should be allowed small doses of alum whey, and be kept on linseed tea or thin oat meal gruel, with milk of healthy cows.

#### GANGRENE OF THE TAIL.

Cows more frequently than oxen, suffer from this curious disease, which has spread occasionally as an epizootic over different parts of the continent. Hering refers to it as it appeared in Wurtemberg, in 1817, and Rychner has furnished us with a good description of the symptoms. Without any general or internal affection, the tail becomes paralyzed, and its skin soft and cedematous, particularly towards its end. On opening it,

a foetid ichor is discharged. The disease spreads towards the roots of the tail, where separation usually occurs, and the animal remains tailless.

The cause is unknown, and the treatment adopted consists in amputating the tail at the point first noticed, where the disease is limited, and then applying the actual canter to the stump.

#### SIBERIAN BOIL PLAGUE.

This malady, not confined to cattle, but seizing men as well as animals, is observed as its name implies in Siberia, and according to some only on the Steppes. It is sometimes slow and chronic, and at others malignant and rapidly fatal. It bears a close analogy to black quarter, and is doubtless a form of anthrax.

#### INFLAMMATION.

Of the many animals supposed to have died of inflammation, very few have really been the subjects of inflammatory disease. When severe pain is observed, particularly if abdominal, it is ascribed to inflammation; and in attempting recently to draw up a list of the relative frequency of different diseases in animals, I found in cattle-insurance registers, simply "inflammation" stated so frequently as a cause of death, that I had some difficulty in arriving at a tolerably accurate idea. When the term is used alone, without any organ being specified, the case turns out to be one of intestinal obstruction and colic.

The inflammatory process is, however, connected with many maladies the nature of which is frequently little suspected. Every tissue of the body may become inflamed, and the symptoms are local, if the part implicated is not extensive, and comparatively unimportant; general symptoms, however, set in when any internal organ or very sensitive structure is involved.

Pain, heat, redness, and swelling, are observed on any superficial part which may be inflamed. The pain varies in intensity according to the part affected, and is usually most severe when the latter is inelastic and swells but slightly. It varies in

intensity according to the sensitiveness of the animal, and its seat, when internal, cannot be determined with the same precision in dumb animals as in men. No doubt, referring pain to a particular spot, a patient considerably assists a physician in his diagnosis; but it is remarkable to what extent collateral circumstances facilitate the veterinarian in discovering what organ is inflamed. The pain is partly due to the pressure on the nerves in the tense tissues, and partly to a structural or functional change which the nerves suffer from, in common with the other constituents of an inflamed structure.

Heat is a valuable symptom, especially when general, and due to the constitutional excitement attendant on any local inflammation. It is then coupled with dryness of skin and mouth, quick and strong or hard pulse, constipation, and indeed, all the indications of a fever or general disturbance. The redness is not often seen in hairy animals, and the swelling may be due to the simple accumulation of fluid and not to inflammation.

It is not easy to define inflammation. Some regard it as differing from congestion or stagnation of blood by the material—lymph—which is exuded. Professor Bennett says: "When congestion is active, or arises from irritation of the textures, it may, if excessive, terminate in the exudation through its coats of *liquor sanguinis*. This is inflammation; an expression still used very vaguely by some physiologists, but which, thus defined, separates the morbid state accurately from congestion on the one hand, and from dropsy or the process of growth, on the other." The great objection to this definition is, that it entirely disregards the essence of the disease, and which consists in the impaired vital powers of structure rather than in simple changes in its material condition.

The results of inflammation vary, according to the severity of the cause which induces it, the nature of the structure involved, the constitutional peculiarities of the animal affected, and the treatment to which it is subjected. Mortification is the most dreaded consequence, but fortunately it is more frequent to observe resolution, or the gradual disappearance of all in-

flammatory phenomena. Persistence of superficial inflammation produces a solution of continuity, and constitutes *ulceration*. The history of most of the results of inflammation consists, in a great measure, in the history of the change which the exudation undergoes. It may gradually become absorbed, and the tissues regain their normal state—*resolution*. It may undergo a certain degree of development, cells forming which retain their vesicular form without further change, and floating in liquid, constituted by the liquid elements of the lymph; this is pus, and the transformation is termed the act of *suppuration*. The cells may, from the condition of the adjoining textures, and the lymph itself favoring it, undergo a further development into elongated cells and fibres; fibrous tissue is formed; this is the adhesive process. In some instances, this tissue replaces material destroyed during the inflammatory process, and *reparation* is consequently brought about. In other cases the solidified exudation remains in the substance of a soft texture, hardening it, and constituting that result of inflammation which has been termed *induration*.

In the treatment of inflammation, recourse may be had to blood-letting, generally, or locally, in the early or premonitory stage. A cow supports a very copious abstraction of blood in severe cases of inflammation. Six quarts is usually an ample loss for her to sustain. Locally, blood may be removed by scarifying, viz.: puncturing the tissue in various parts, or by opening some of the smaller veins. Evacuants, such as purgatives, diaphoretics, and injections, are of essential service. When an animal cannot be bled from the tendency to low constitutional symptoms, it can be purged mildly; or a safer plan is to rely on salines, which act on the plastic blood, favor exhalation, induce considerable depression, and allay the fever. Of these are the *liquor ammonia acetatis*, given in four ounce doses in twice as much tepid water, every three hours; nitre, in half-ounce doses, in solution, at short intervals; sulphate of soda, acetate of soda or potash, and other neutral salts. We recommend all non-professional persons not to meddle with

mercurials, antimonials, sedatives and narcotics, which often do more harm than good, and at all times call for skill in their prescription. Of the many remedies which may be employed in inflammation, we may revert to *cold*. Cold water, applied constantly in the early stages, occasionally checks an inflammatory attack. In an advanced inflammation, it produces pain, and even gangrene. Warm water in the shape of fomentations and poultices should then be used. Hot water baths, so useful in the treatment of inflammatory diseases in man and the smaller animals, can be but little used in the larger quadrupeds; but the Roman baths recently introduced, may certainly occupy their places with great advantage. Sudden variations in temperature are very prejudicial to a patient suffering from inflammation, and a uniform temperature, about 62° Fahrenheit, is very favorable to recovery. Next to heat and cold we must revert to the use of *rubefacients*, which draw the blood of the skin, and subdue the inflammation. The best of these are the ammonia soap, or turpentine liniments. Blisters are of great service, either in the form of mild mustard poultice, or the active preparations of cantharides, croton oil, tartar emetic, biniodide of mercury, and a few others.

*Abscess*.—This is one of the results of inflammation, and consists in a deep-seated suppuration of the pus having always a tendency to attain the surface. The symptoms in the early stage may be limited to indications of severe pain, a circumscribed, hard, and tender swelling now appears, and in the course of a few hours, or in some cases, after many days, the tumor feels soft, fluctuates, and perhaps bursts spontaneously. The approach of the matter to the surface is termed the process of pointing, which occurs by the advancing abscess pushing aside important structures and leading to the removal of tissue by absorption. The pointing of an abscess should always be favored, and when from the elastic and fluctuating feel of the tumor matter proves to have been collected, it should be evacuated at once by puncturing the abscess. Sometimes the formation of an abscess is prevented by a stimulating liniment or a

blister. If suppuration has actively set in, these remedies expedite the process, or in order to hurry it, fomentations and large bran or linseed meal poultices must be applied. In cows many different abscesses are met with; the most severe is the *milk abscess*, which we shall consider under the head of diseases of the udder.

*Fistula*.—When fistula forms between tough and inelastic tissues, the pus burrows in various directions to obtain an outlet. Channels are thus formed, termed sinuses or fistulæ. In some cases an abscess points without obstruction, but its closure is afterwards impeded by secretions flowing through it, as in milk abscess, or from other causes, and the cavity is transformed into a narrow sinus. The wall of the abscess, which is constituted by the lymph progressively exuded and being transformed into pus, becomes firm and horny, though not usually organized. It is the wall of the sinus which constitutes the “core,” a removal of which is speedily followed by disappearance of any fistulous track. The treatment of a fistula is chiefly surgical, and consists in slitting up the wall with a knife, or causing it to slough out by active caustics. Sometimes an astringent lotion of alum, diacetate, or sulphate of zinc may prove sufficient; but at other times, solutions of nitrate of silver, chloride of zinc, and bichloride of mercury are called for.

*Ulceration*.—An ulcer not only owes its origin to inflammation, but cannot continue without persistent inflammatory action. It is a superficial destruction of tissue, going on more or less rapidly, with a greater or less discharge, and leaving no tendency to heal spontaneously. Cows are rather often subject to ulcers; they are seen about the lips, tongue, and different parts of the skin. They usually yield to the application of astringent lotions, such as six grains of sulphate of zinc to the ounce of water, or they need the application of caustic, the nitrate of silver, or burning with the hot iron. The last operation requires to be very carefully performed, but in many cases is most efficacious. On the limbs, pressure, and the frequent



use of cold water, tends to the cure of ulcers. In many superficial ulcers, the oxide of zinc ointment is invaluable.

#### DISEASES OF THE DIGESTIVE ORGANS.

In all herbivorous quadrupeds in a state of domestication, the diseases of the alimentary canal are most common and fatal of all sporadic affections, that is to say, of all diseases irrespective of plagues and closely allied affections. A functional disturbance of the digestive organs may be observed in almost every serious malady affecting the system. Thus increased, diminished or perverted appetite, as frequently indicate diseases of other organs, as of the digestive apparatus, and I shall often have occasion to refer to them as symptoms.

#### DISEASES OF THE MOUTH.

The mouth is the seat of various diseases, but I need at present only refer to the two more common affections. The first is inflammation of the lining membrane of the mouth, and of the tongue, due to irritants of hot and caustic liquids which an animal may introduce or have poured into its mouth. The nature of the accident is indicated by great pain and uneasiness, with a frothy discharge of saliva, swollen tongue, and discolored internal surface of the mouth, and sometimes with much fever. The local destruction is generally very slight, but a cow is prevented from feeding for several days, and the secretion of milk is stopped. This may give rise to considerable inconvenience. Treatment consists in washing the mouth often with water, or a lotion containing a wine-glass full of vinegar, and a table spoonful of honey to a pint of water; a mild laxative should be given, and in some severe cases a more active stringent lotion, consisting of half an ounce of alum to the quart of water, may prove of great service.

*Aptha or Thrush.*—A vesicular eruption in the mouth, which is sometimes mistaken for the malignant Glossanthrax, before described, and at others with Epizootic Aptha, which disease it most resembles. It is, however, rarely produced by contagion, and is only an indication of irritation in the mouth of young

animals during the whole period of dentition. The inflammation of the mucous membrane of the mouth, and the vesicular eruption which ensues, may, in some instances, extend through the alimentary canal, induce considerable fever, great prostration, diarrhoea, and even death. Usually the malady is localized in the mouth, and it is readily checked by mild purgatives and the local application of vinegar and honey or alum lotion.

#### ULCERATION OF THE TONGUE.

Sometimes, as one of the consequences of Glossitis, or inflammation of the tongue, and at others from causes not easily ascertained, such as accident or constitutional predisposition, the mucous membrane of the tongue becomes the seat of ulceration. The symptoms vary much, according to the severity of the disease. Sometimes there is but slight inconvenience produced by a slowly spreading ulcer, which may invade the back of the tongue, and even extend towards the throat. At others, considerable irritation and fever attend a sloughing ulcer, which may manifest a malignant character. The benignant form of the disease is most common, and I have seen ulceration extend from the tongue on to the cheeks, palate and nose.

Treatment consists in the local use of caustics, varying in activity, according to the disposition manifested in the ulcer to heal. Internally, we find in the milder cases, ferruginous tonics of great service. In the malignant cases, acid mixtures, liquor ammonia acetatis, and other salines may be used freely.

Abscess of the tongue, and induration of this organ, are both results of inflammation, and require treatment on surgical principles. The abscess should be opened as soon as possible; and in the event of any hardening of the tissues of the tongue, preparations of iodine given internally, or applied between the jaws in the form of the compound iodine ointment, may prove of great service.

#### DISEASES OF THE JAWS AND TEETH.

Cattle are not often subject to diseases of their teeth; but occasionally the jaws become affected, implicating the teeth as

well. This malady has not received a very appropriate name, and the common term, "osteo-sarcoma," applied to many bone diseases has been used in this. I would prefer the name, "fibro-plastic tumor of the jaw," or, from the peculiar appearance of the bony texture in its transformed state, "spongy tumor of bone." A tumor is observed generally between the ages of three and six years, and it occupies either the upper and lateral parts of the face, over the region of the upper grinders, or one of the sides of the lower jaw. The swelling is small at first, and painful. It gradually increases until it attains an enormous size; sometimes not less than that of an infant's head. So long as the tumor is not touched, the skin remains loose and pliable over it; but by the common measures of treatment adopted, ulceration is induced, the subjacent tissues become hard, and acquire great thickness. On examining one of these tumors after death, it is found to be composed of a heavy mass of fibro-plastic tissue, intersected in every way by bony plates. \* \* \* Here and there a circumscribed yellow deposit indicates where the lymph cells have remained untouched. There is a fatty deposit of granular matter intermingled with imperfectly developed and degenerate lymph cells wherever the tissue appears friable. In the tougher parts, fibro-plastic cells and fibrous tissue are easily discerned. This malady is incurable, and owners of cattle should not allow them to be treated for any length of time. It is only when the first indication of enlargement is observed that a blister over it may have any effect in causing it to be removed. If this be ineffectual the animal had better be fattened as soon as possible and slaughtered.

#### INFLAMMATION OF THE PHARYNX AND THROAT.

The pharynx is usually affected in cases of common sore throat. I may here mention, however, that a German veterinarian, Sticker, has observed a dangerous form of inflammation of the tonsils in cattle, attended with difficult breathing, difficulty in swallowing, and general disturbance, accompanied by

obvious wasting. The enlargements rarely suppurated. In such cases, besides general remedies, the best medicine would be an astringent electuary.

#### GASTRITIS—GASTRO-ENTERITIS.

*Inflammation of the Stomach, or of the Stomach and Intestines*—*Wood-evil, Moor-ill.*—As an idiopathic or primary disease, this is exceedingly rare in cows. Like all other animals, however, the alimentary canal becomes inflamed under the influence of irritant poisons, whether vegetable or mineral. Though the common white skit or diarrhoea in calves has been described as gastro-enteritis, I can affirm from numerous post-mortem examinations, that there is no inflammation in such cases, which consist simply in acute and severe indigestion.

Of the irritants most commonly productive of gastritis and gastro-enteritis, we have all the non-metallic irritants which are commonly employed as purgatives, besides the alkalies and acids. Of the metallic irritants, arsenic is the most commonly productive of injurious results; but the vegetable irritants are numerous—the anemone, bryony, mercurialis annua, ranunculus, savin, common heather, common oak branches, ergotized grasses, if eaten in quantities by cows, or if any of the ordinary vegetable purgatives are given to them in excessive doses, the stomach and intestines become violently inflamed.

The symptoms induced by one of these poisons—the mercurialis annua—are mentioned. I need not particularize further. They consist in loss of appetite, suspended rumination, dullness, hot and dry mouth, dry skin, tympanitis, pains in the abdomen, great sensibility of the loins, stiff back, cold extremities, bloody urine, diminished secretion of milk, accelerated breathing, small, contracted pulse, dilated pupils, and reddened mucus membranes; in some cases, plaintive cries, the mammae become indurated, the teats waste, and diarrhoea occurs with very offensive excreta. Abortion is observed when pregnant cows are affected.

The wood-evil which is dependent on cows eating the astringent shoots of trees, such as oak, is doubtless attended by much irritation of the alimentary canal: but the discolored urine, referred to in the foregoing paragraph, occurs in the wood-evil or black water, so as to class the disease amongst those affections in which there is a fundamental blood change and irritation of the kidneys.

*Treatment.*—In all cases of irritation of the alimentary canal, the irritant must be neutralized, if possible, by an antidote, as in the case of arsenic, by the exhibition of lime-water, magnesia, or the hydrated peroxide of iron. The substance then is dislodged by a purgative, or the mucus membrane of the alimentary canal is protected by emollient substances, such as mucilage, linseed tea, etc. Emollient clysters, fomentation to the abdomen, and in some cases external irritants are employed. Animals require the most careful nursing, and often succumb before sufficient can be done to restore them.

#### COLIC.

Any affection, attended by abdominal pain may be termed *colic*; but true colic is a spasmodic affection of the large intestines, the pain being induced by the inordinate action of the bowels in dislodging some offending agent. Colic is more rare and not so fatal in cattle as in horses. The symptoms of colic consist in uneasiness, striking the belly, crouching, lying down and springing up again, loss of appetite, suspended rumination, tympanitis, and scanty, if any discharge of dung. Treatment consists in giving clysters and administering a purgative.

#### STRANGULATION OF THE INTESTINE.

From the peculiar arrangement of the intestine of a cow, it is almost impossible that one portion should be inserted into another, or that it should be strangulated by forming hernia through the mesentery. Nevertheless, however impossible such an accident may at first sight appear, it has occurred, and necessarily proved fatal.

## DYSENTERY.

This common disease amongst cows, consists in inflammation of the large intestine, with diarrhoea, discharge of blood per rectum, and rapid emaciation. It may be acute or chronic, and occurs frequently toward the latter stage of some other prostrating disease, as the system gets worn out, and is in that state termed hectic.

Yonatt's description of dysentery is perhaps the happiest of his attempts in relating the history of any disease of cattle. I am tempted to quote what he says regarding the causes of dysentery:

"Dysentery may be a symptom and a concomitant of other diseases. It is one of the most fearful characteristics of murrain; it is the destructive accompaniment or consequence of phthisis. It is produced by the sudden disappearance of a cutaneous eruption; it follows the cessation of chronic hoose; it is the consequence of natural or artificial suspension of every secretion. Were a secretion to be particularly selected, the repression of which would produce dysentery, it would be that of milk. How often does the farmer observe that no sooner does a milch cow cease her usual supply of milk than she begins to purge. There may not appear to be anything else the matter with her, but she purges, and in the majority of cases that purging is fatal.

"It may sometimes, however, be traced to sufficient causes, exclusive of previous disease. Unwholesome food—exposure to cold—neglect at the time of calving—low and marshy situations—the feeding on meadows that have been flooded (here it is particularly fatal)—the grazing (according to Mr. Leigh, and our experience confirms his statement) upon the clays lying over the blue lias rock—the neighborhood of woods and half stagnant rivers—the continuation of unusually sultry weather—overwork and all the causes of acute dysentery may produce that of a chronic nature—or acute dysentery neglected, or badly, or even most skillfully treated, may degenerate into

an incurable chronic affection. Half starve a cow, or over-feed her; milk her to exhaustion, or dry her milk too rapidly, dysentery may follow."

Though we not unfrequently see a cow affected with dysentery standing for weeks and months amongst a lot of healthy cows, nevertheless it is often epizootic.

*Symptoms.*—The acute form is attended with severe symptoms of general disturbance, often ushered in by shivering fits. The temperature of the body is variable; the animal becomes hide-bound and its coat stares; the back becomes slightly arched and the loins are sensitive. The eyes are dull and occasionally the seat of discharge. The mouth is clammy, and tongue furred and dirty looking. The animal yawns and grunts, and at short intervals discharges a variable quantity of thin watery excrement tinged with blood. The straining is generally violent and distressing. The animal draws its limbs together, arches its back, extends its tail, and the anus appears sore and red. The urine discharged is of dark-red color. The amount of abdominal pain varies considerably; sometimes there is sever colic, and at others general tenderness. Gaseous distention of the paunch not uncommonly complicates the disease.

The constitutional symptoms are commonly those of a low typhoid disease. The animal becomes dull, emaciated, suffers from thirst. An aphthous eruption in the mouth indicates the condition of the intestinal mucus surface, where in some cases there is severe ulceration, whence the blood is discharged, or abscesses. Unless by judicious treatment the symptoms are made to subside, they increase in severity, and in a fortnight from the commencement of the disease, the animal is dead. If the chronic type of the disease declares itself the animal may linger along for an indefinite period of time.

In the chronic cases the general symptoms are very severe, and faithfully enough portrayed by Youatt, who says: "The beast is sadly wasted—vermine accumulate on him—his teeth

become loose—swellings appear under the jaw and he dies from absolute exhaustion; or the dejections gradually change their character—blood mingles with the mucus—purulent matter succeeds to that—it is almost insupportably foetid—it is discharged involuntarily—gangrenous ulcers about the anus sometimes tell of the process that is going on within; and, at length the eyes grow dim and sunk in their orbits, the body is covered with cold perspiration, and the animal dies.

“In some cases the emaciation is frightful; the skin cleaves to the bones, and the animal has become a living skeleton; in others there have been swellings about the joints, spreading over the legs generally, occasionally ulcerated; and in all the leading color of the membranes, the rapid loss of strength, the stench of the excrement, and the unpleasant odor arising from the animal itself, announce the approach of death.”

The post mortem appearances of dysentery are:—Ready removal of the epithelium over the three first stomachs, which are usually pretty empty; the third may contain some solid food. The fourth stomach is the seat of reddish discoloration of its mucus membrane, which is occasionally cedematous, and at others the seat of exudation of lymph, which has been said to give it the appearance of jelly. The small intestine, distended by fluid material, is occasionally injected, but often presenting no abnormal appearance. The cœcum, colon and rectum are obviously inflamed. The mucus membrane, red with abrasions or ulcerations, varying in extent, and sometimes perforating the intestine. In some cases abscesses exist in the sub-mucus tissue. Ecchymoses, and even spots where sloughing is going on, are apparent in the large intestine.

*Treatment.*—In some acute cases of dysentery, advantage is said to have been derived from blood-letting. Greater reliance is to be placed in the use of mild aperients and emollient clysters. Calomel and opium, of each a scruple, given thrice daily for one or two days, have been attended with much benefit. The severe inflammatory symptoms having subsided, styptic and stimulating remedies, which act copiously on the



mucus membrane of the intestine, can be prescribed. Acetate of zinc, acetate of lead, and turpentine, all given in small doses rather frequently, and in large quantities of thin gruel and decoction of linseed, prove of service. Some veterinarians have obtained benefit from employing drachm doses of sulphate of copper. Chloride of lime, a drachm to a quart of water, proves beneficial. Chalk, alone or combined with opium, has been much used, and with advantage when the acute symptoms are subdued. Other astringents, such as lime and catechu have been employed; but as a general rule, great care should be taken not to load the intestines with many medicines which are apt to irritate. Judicious diet is of great service in assisting an animal towards convalescence.

#### INTESTINAL WORMS.

The *strongylus radiatus* and *ascaris lumbricoides* are amongst the most common round worms to be met with in the intestine of the ox. *Ascarides* abound in the small intestine of weakly calves within a very short time after birth, and the system suffers very severely, as indicated by great emaciation, and when the animals are killed the flesh has a peculiarly disagreeable mawkish odor. The best remedy in these cases is iron, either in the form of iron-filings or powdered sulphate of iron, given in treacle [molasses] as an electuary. The worms are rapidly discharged, and the young animal acquires strength and condition. Cows are not often troubled with tape-worm, though two kinds *tenia expansa* and *tenia denticulata*, are commonly met with in the intestines. The only symptoms of their presence during life, are the discharge of rings of the worms, attended by a little intestinal irritation. The best remedy is turpentine in mucilage or thick linseed tea.

#### JAUNDICE.

The disease causes the yellow discoloration of the tissues of the body by the coloring principle of the bile circulating in the blood. It is not unfrequently seen in cows as an idio-

pathic affection, though more commonly as a symptom of other diseases.

*Symptoms.*—When jaundice occurs as an idiopathic malady, it is detected by the yellow color of the visible mucus membranes and the skin. There is usually loss of appetite, a slimy furred tongue, dry, hard dung covered with mucus. The digestive organs are most disturbed, and the coloring principles of bile are discharged by the kidneys, as proved by the manner in which it tinges paper when dipped in the urine and dried. If jaundice is not relieved, the animal completely loses its appetite, becomes anæmic, its limbs are occasionally cedematous, and the temperature of the body becomes low. These symptoms then continue, notwithstanding active measures being directed for their removal.

*Post-mortem Appearances.*—In cases of jaundice which terminate fatally, the gall-ducts are found indurated or obstructed by gall-stones, hydatids, abscesses, or other enlargements which form on them.

The nature of jaundice, and particularly that form which many regard as dependent more on functional inactivity and changes in the blood, than due to any active cause in the liver, have given rise to considerable discussion. Frerich's views of the cause of jaundice in these cases, are given by Dr. Murchison in the following terms:

“The author endeavors to explain certain obscure forms of jaundice, where there is no mechanical obstruction to the excreting ducts of the liver, such, for instance, as the jaundice, which has been observed in pyæmia, typhus, and after snake-bites, on the supposition of an arrested consumption of the biliary acids which have been reabsorbed into the blood, either from the intestines or directly from the liver. Arguments are brought forward which render it probable that even in a state of health, all the bile formed in the liver does not pass into the bile ducts, but that a portion of it enters the hepatic veins along with the sugar, the quantity which thus

enters varying with the distribution of the blood in the gland, and with the relative degrees of pressure exerted by the contents of the veins, and of the minute bile-ducts upon the secreting cells, being largest where the pressure on the sides of the veins is least, and where that on the ducts is greatest. The biliary acids which thus enter the blood, or which are re-absorbed from the intestines, are supposed to undergo certain changes from oxydation, and may thus account for the large quantity of taurine which has been found in the healthy lung, and for the pigments which are naturally voided in the urine. When, however, anything interferes with these normal metamorphoses in the blood, as when this fluid becomes contaminated by the purulent infection, or by any other poison, it is supposed that the complete metamorphosis of the colorless bile into urinary pigment is arrested, and that the intermediate substance, bile-pigment, is formed in the blood, so as to color the various tissues and secretions. The arrested metamorphosis of the biliary acids, under such circumstances, is thought to be analogous to the arrested metamorphosis of the sugar formed in the liver which leads to diabetes."

The treatment of jaundice consists in the internal use of aloes and saline purgatives. After these, if jaundice continue, a dose of calomel may be given, but perhaps greater reliance can be placed in continuing with neutral salts, such as nitre and sulphate of soda, in two or four ounce doses daily. Turpentine in linseed tea, either alone or combined with aloes, has been recommended, besides the external use of rubefacients. Clysters prove of great service in the treatment of this disease.

## RETURNS FROM AGRICULTURAL SOCIETIES.

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TRANSACTIONS OF THE MICHIGAN STATE AGRICULTURAL SOCIETY, FOR 1867.

*Annual Meeting of the Executive Committee.*

DETROIT, January 15, 1867.

In pursuance of a call by the President, the Executive Committee of the Michigan State Agricultural Society met at the Michigan Exchange, Detroit, on the evening of Tuesday, January 15, 1867.

The President, W. C. Beckwith, Esq., of Cassopolis, called the members to order, and the following answered to their names:

J. A. Walter, Kalamazoo; W. J. Baxter, Jonesville; K. C. Barker, Detroit; S. S. Bailey, Grand Rapids; Wm. Bort, Niles; Sanford Howard, Lansing; John Gilbert, Ypsilanti; John Allen, Plymouth; C. W. Greene, Farmington; W. S. Willcox, Adrian; G. W. Phillips, Romeo; J. M. Sterling, Monroe; Marvin Dorrell, Jackson; E. O. Humphrey, Kalamazoo, Treasurer, and R. F. Johnstone, Detroit, Secretary.

The President made the following address to the members:

*Gentlemen of the Executive Committee:*

It gives me pleasure to state that since our last annual meeting at this place, the demands of our rapidly increasing population upon the agricultural interests of the State have been promptly met by our husbandmen, leaving them at the same time a liberal surplus with which to meet the exigencies of the

new year. Indeed, all industrial pursuits seem to have greatly prospered, notwithstanding the crisis anticipated by many of general prostration of all kinds of business, consequent upon the contraction of our paper currency, which is looked for, and a sudden return to specie payment. While I do not deem it my duty to discuss the finances of our country, yet they are so closely allied to the interests of the working men of Michigan, I take it upon myself to say that it would be well for us all to put our houses in order for the crisis, when it shall come, be that sooner or later. That we can pay our debts easier when money is abundant and prices high, than when it is scarce and prices low, needs no urging from me. Let us watch closely the signs of the times, until the question of our national currency is definitely settled by the business and legislation of the country.

The finances of the society still continue in a healthy condition, as will appear from the Treasurer's report.

We have a State Agricultural College, an institution, for the success of which our entire population should feel a deep and abiding interest. But whether the facts in the case would warrant me in saying that such an interest is really felt, I leave to the practical men of Michigan, of all classes, to determine. As for myself, I do not hesitate to say that much, very much may be done to stimulate that institution, to bring the College up to that point where the masses will regard it, and speak of it with pride, rather than in that equivocal manner, and with that indifference which characterizes their remarks generally, when reference is made to it. They should be convinced that it is an institution for the thorough education of our young men, in all the branches of practical agriculture. We should be able to look up to its graduates as men well qualified to manage our farms and bring to bear upon them a complete system, acknowledged at once scientific and practical, which shall be adapted to our various soils, climate, local circumstances and surroundings. As a means to secure this end, I would suggest that you recommend to the Legislature now in session

at Lansing, that a committee be appointed by either branch of that body, to meet a like committee to be appointed by you; that the committees thus formed, meet a committee of the board having control of the College, for the purpose of conferring together upon subjects connected with the management and prosperity of the institution. That such a conference would meet the entire approval of the people of Michigan, I have no doubt. If no good should result from it, certainly no harm could. Suggestions might be made to the Legislature by these committees, which, if acted upon, would result in great good to the College, by making the people better acquainted with its workings, and bring their minds directly home to the necessity of giving it their support. That those having charge of the College have succeeded as well, under the circumstances, as could be expected of them, I am free to admit. They doubtless labor under many embarrassments which proper legislation might remove. As the State Society is designed to foster our agricultural and mechanical interests, it is reasonable to suppose that those controlling its efforts should look to the College as a powerful auxiliary, whose interests are identical, whose success or failure depends upon public favor.

Heretofore too much attention, and large premiums have been paid to running and fancy trotting horses. I would recommend that this class be left in the hands of the different societies in this State, who make the horse a specialty. They are better prepared for trials of speed, and better understand the rules of the Long Island Course than the majority of farmers, from whom our viewing committees are selected. In a large majority of cases, the running horse is a small, nervous, sinewy animal, but poorly calculated for a roadster, or for labor on the farm, lacking, as he does, size, weight, and other valuable characteristics of the carriage or farm horse. For the turf, merely, he becomes valuable after his qualities have been determined by actual test. Yet, after subjecting this class of horses to the ordeal, nine-tenths of their colts fail to come up to the expectations of breeders as fast horses, and are, to use a

common expression, weeded out. The horses thus rejected, in the main, are poorly calculated for use on the farm or road, for reasons already mentioned. Beside, I do not believe that trials of speed for money, at our State fairs, should be longer tolerated, for the reason that they amount to no more nor less than a species of fashionable gambling, prejudicial alike to the interests of the Society, and the moral sense of a large and respectable portion of the people. We would hardly consent that our boys should patronize the race-course, on account of the bad influence it would have upon them. Then why should we, as a State organization, throw over the practice the mantle of morality, and thus give license to do that on a large scale, which we heartily condemn in a small way. The desire to breed fast running, and fancy trotting horses, without regard to other qualifications, has had the effect of lessening the value, and lowering the standard of horses in this State. In my opinion, we should rather encourage the introduction of horses of fair size, weight and form, that come up to the standard of the horses of all work; also the breeding from a class of mares that will give the size, weight and action that are so desirable in the first class carriage horse.

In regard to the encouragement we should give to wool-growing, I have nothing to add to the views expressed by me at our meeting one year ago. That the importance of that branch of industry demands our careful consideration, and what aid our Society can give, I suppose none will deny. The convention held in Jackson, in February last, to discuss the questions of wool-growing, stock-raising and agricultural interests in general, I think was productive of much good. I would therefore recommend the calling of another meeting of the same kind to assemble at such place on the Michigan Central Railroad as you think proper to name.

The several classes of cattle, the breeding of which has heretofore been deemed advisable to encourage at our State fairs by offers of liberal premiums, should claim no less of your attention now than formerly. Our people are making con-

siderable advancement in the improvement of our stock of cattle, and though behind some of the neighboring States in this respect, still we may hope soon to equal, if not take a position in advance of any of them, if this Society exerts itself as it should.

While offering liberal premiums to encourage the raising of the best horses, cattle and sheep, you doubtless will give all other domestic animals and fowls necessary for man's use, subsistence and comfort, such attention as their respective claims demand.

In mechanical arts our people are not behind those of any other State, and in this age of progress it becomes the duty of this Society, so far as in it lies, to show its appreciation of the inventive genius and practical skill of our mechanics, by offering liberal premiums for every invention and improvement which, upon proper test, is deemed to possess decided merit, or is a thing of practical utility.

Michigan, already famous as a fruit-growing State, may do much to improve both the quality and the quantity of her fruit. No State in the Union is able to cope with us, so far as the quality of fruit is concerned, both large and small. It would be well to take such steps as shall bring out at our fairs the best and choicest specimens and varieties. The course adopted by you last year of giving premiums to congressional districts for largest and best varieties and specimens worked well, in my opinion, and the practice should, I think, be continued.

While I would continue to recommend a liberal premium list for the present year, encouraging, as far as in our power, every branch of industry that contributes to the wealth and support of our people, your own good judgment will caution you against an unnecessary expenditure of the funds committed to your charge.

#### REPORT OF THE TREASURER.

The Treasurer submitted the following annual report for 1866:



Finding it necessary to meet the demands against the treasury, I have sold \$4,000 worth of the bonds belonging to the Society. I have also collected \$1,000 of the notes held against James Berry, for lumber, which, in all, amounts to \$5,000, that has been converted over and above the receipts from the fair and other sources.

## RECEIPTS.

Balance on hand January 1, 1866, .....	\$1,904 97
Sale of tickets at the fair, .....	4,461 31
Entry fees, .....	705 00
For rent of grounds, .....	615 50
Spring Brook Association, .....	762 23
Coupons, .....	807 60
Sale of bonds, .....	4,221 91
Note of James Berry, .....	1,000 00
Total receipts, .....	<u>\$14,476 52</u>

## DISBURSEMENTS.

Premium checks, 1865, .....	\$ 470 33
Premium checks, 1866, .....	7,581 00
Business checks, 1865, .....	35 04
Business checks, 1866, .....	5,497 82
Balance in treasury, .....	892 33
Total, .....	<u>\$14,476 52</u>

## AMOUNT OF PROPERTY BELONGING TO SOCIETY.

Cash on hand, .....	\$ 892 33
Bonds, .....	5,000 00
Notes of James Berry, .....	2,925 00
Total, .....	<u>\$8,817 33</u>

## REPORT OF THE SECRETARY.

The Secretary submitted the following annual report for 1866:

*To the President and Executive Committee of the Mich. State Agricultural Society:*

The Secretary submits the following report as a statement of the business of the Michigan State Agricultural Society for the year ending Dec. 31, 1866:

There was remaining on hand on the first day of January, 1866, the following amounts invested and uninvested, after all accounts and checks had been paid that had been presented to that date:

Invested in 5-20 U. S. bonds,.....	\$4,000 00
"    10-40 U. S. bonds,.....	3,000 00
"    7-30 U. S. bonds,.....	2,000 00
"    building fund of museum,.....	3,250 00
Balance in hands of Treasurer,.....	1,904 97
	<u>\$14,154 97</u>

There has been received from the various sources named below, the following amounts, viz:

From interest coupons,.....	\$ 807 60
"    sale of tickets at State Fair at Adrian,.....	4,461 31
"    entries received by Secretary,.....	703 00
"    rent of grounds at Fair,.....	815 50
"    subscription at Adrian,.....	762 23
"    sale of buildings at Adrian,.....	3,925 00
"    premiums on sale of bonds,.....	221 95
	<u>11,696 59</u>

Total funds of the Society for the year, .....\$25,851 56

The expenditures have been as follows, for the year:

Premium checks issued for awards made in 1865,....	\$ 346 33
Total amount of checks issued for premiums awarded in 1866. See schedule B for complete list,.....	8,088 00
Total amount of checks issued for general expenses of Society during the year,.....	5,588 19
Total expenses for the year 1866,.....	<u>\$14,022 52</u>

Funds on hand December 31, 1866, viz:

U. S. 5-20 bonds,.....	\$2,000 00
U. S. 10-40 bonds, .....	3,000 00
Building fund of museum,.....	3,250 00
Notes for sale of buildings at Adrian,....	2,925 00
	<u>11,175 00</u>
	<u>25,194 52</u>
	<u>\$654 04</u>

The total funds of the Society remaining on hand at the close of the year, are the amounts enumerated above, viz:.....\$11,175 00  
And the balance in the hands of the Treasurer, of..... 996 00

\$12,171 00

The details of the general expenditures of the Society have been classified in the following table, so as to present in as brief and clear a form as possible the particulars of each of the various expenses. The full particulars of each payment, with the name of the party to whom the payment has been made, will be found in the detailed list accompanying this report, marked A, and the complete list of the checks drawn for premiums will be found in the schedule marked B:

**Class.**

1. Paid on account of expenses of 1865,.....	\$ 84 88
2. Winter meeting of the Executive Committee at Detroit,....	210 00
3. Meeting at Jackson,.....	37 60
4. Preparations and buildings for the Fair—lumber, \$1,085 08	
5. Labor and pay rolls,.....	560 87
6. Work on grounds, drayage, etc.,.....	205 03
	<hr/>
	1,850 98
7. Postage, express, telegraph, etc.,.....	183 77
8. Decorations and fitting up buildings,.....	264 87
9. Evergreens, moss, and other materials,.....	194 33
10. Police, watch and superintendence,.....	89 75
11. Straw and hay,.....	259 93
12. Music,.....	200 00
13. Assistants and Secretary's office,.....	258 30
14. Expenses of business committee,.....	27 50
15. Stationery and blank books,.....	64 88
16. Printing accounts,.....	781 97
17. Advertising and posting,.....	87 50
18. Cost of committees and miscellaneous expenses,.....	184 90
19. Salary of Secretary,.....	600 00
20. Rent of office,.....	20 00
21. Treasurer's expenses,.....	110 03
23. Expenses of committee on farms,.....	78 00
	<hr/>
	\$5,588 19
	<hr/>

The premiums awarded and issued for the year 1866 have been as follows:

**CATTLE.****Class.**

1. Short-horns, .....	\$445 00
2. Devons, .....	345 00
3. Herefords, .....	170 00
4. None, .....	

**Class.**

5. None, .....	
6. Herds, .....	\$300 00
7. Grades, .....	56 00
8. Working oxen, .....	125 00
9. Fat cattle, .....	57 00
10. Citizens' premiums, .....	200 00
	<hr/>
	\$1,698 00

**B.—HORSES.**

11. Thoroughbreds, .....	\$ 75 00
12. Part thoroughbred, .....	79 00
13. Horses for all work, .....	254 00
14. Roadsters and trotting stock, .....	375 00
15. Draught, .....	87 00
16. Stables of colts, .....	50 00
17. Carriage horses, .....	112 00
18. Matched and cavalry, .....	75 00
19. Jacks and mules, .....	73 00
	<hr/>
	1,180 00

**C.—SHEEP, SWINE AND POULTRY.**

20. Thoroughbred merinos, .....	\$ 80 00
21. Michigan fine wools, .....	57 00
22. Spanish mer os, .....	107 00
23. South Downs, .....	13 00
24. Long wools, .....	107 00
25. Fat sheep, .....	16 00
26. Swine, .....	49 00
28. Poultry, .....	26 00
	<hr/>
	435 00

**D.—IMPLEMENTS.**

29. Plows, harrows and drills, .....	\$62 00
30. Haying and harvesting, .....	8 00
31. Machinery, .....	57 00
32. Wagons and carriages, .....	66 00
33. Barnyard implements, .....	28 00
34. Dairy and household, .....	9 00
	<hr/>
	230 00

**E.—SEEDS AND VEGETABLES.**

36. Grain and seeds, .....	\$69 00
37. Vegetables, .....	47 00
	<hr/>
	116 00

## F.—DAIRY AND HOUSEHOLD MANUFACTURES.

## Class.

38. Butter and cheese, .....	\$42 00	
39. Sugar, honey and beehives, .....	15 00	
30. Bread, preserves, etc., .....	64 00	
41. Wines, vinegar and cordials, .....	12 00	
	<hr/>	\$153 00

## G.—MANUFACTURES.

42. Home made, .....	\$65 00	
43. Factory made, .....	10 00	
45. Leather and India rubber, .....	13 00	
	<hr/>	88 00

## H.—FINE ARTS.

48. Painting, penmanship, etc., .....	\$ 55 00	
49. Musical instruments, .....	40 00	
52. Needle, shell and wax work, .....	140 00	
	<hr/>	235 00

## L.—FLOWERS AND FRUITS.

53. Flowers, professional, .....	\$ 51 00	
54. Flowers, amateur, .....	97 00	
55. Fruits by districts, .....	175 00	
57. Apples, amateur, .....	71 00	
58. Pears, amateur, .....	30 00	
59. Peaches and other fruits, .....	18 00	
60. Apples, professional, .....	81 00	
61. Peaches, professional, .....	27 00	
62. Peaches, professional, .....	4 00	
63. Grapes, .....	45 00	
	<hr/>	603 00

## K.—MISCELLANEOUS.

74. Miscellaneous, .....	\$ 18 00	
Premiums on farms, .....	175 00	
Premiums on colts of 1865, .....	20 00	
Citizens' premiums on horses, .....	1,000 00	
Special premium to Dexter, .....	2,000 00	
	<hr/>	3,315 00
Total premiums issued, .....		<u>\$8,088 00</u>

The following table exhibits the number of entries made on each class at the last fair, as compared with the eight years immediately preceding:

## ENTRIES MADE BY EXHIBITORS FOR THE PAST EIGHT YEARS.

	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866
Cattle, .....	255	180	108	120	155	66	86	140
Horses, .....	342	274	217	185	262	227	260	263
Sheep, swine and poultry, .....	225	162	161	121	200	200	218	174
Implements, .....	221	166	180	173	208	207	239	227
Seeds and vegetables, .....	84	54	51	29	14	180	117	181
Dairy and household products, ....	94	87	107	67	78	149	122	156
Manufactures, .....	342	308	220	161	123	108	97	78
Fine arts, .....	194	170	104	126	167	197	273	232
Flowers and fruits, .....	615	338	222	281	256	78	251	308
Miscellaneous, .....	63	44	79	25	21	59	72	87
Crops, .....	5	.....	3	3	1	2	13	14
	2340	1723	1533	1262	1485	1420	1797	1835

In comparing the position of the Society with last year, it will be seen that there is a considerable decrease in the amount of its resources. This, however, is not surprising, when we know that the whole receipts from the sale of tickets at the last annual exhibition was only \$4,461 31, against \$11,838 77 the year previous—a difference against the Society of \$7,377 48.

The increase in the premium list has also drawn heavily on the resources of the Society. In 1865 the total amount of the premiums paid, including the citizens' premium, was only \$4,755 16. The total amount paid for the awards of 1866 is \$8,088, or \$3,852 84 more than was paid the previous year. The cause of a decrease in the reserved funds of the Society from \$19,242 12, to \$11,029 04, is therefore readily accounted for.

By a glance at the classified list of the awards, it will be seen that the premiums in all the classes were very much increased, and it is well known to all acquainted with the Society and its business, that the number of entries would

have been very much greater, had the weather permitted parties who designed to exhibit, to have arrived in time. In the single division of cattle, the difference between the awards of 1865 and 1866, is 101½ per cent.; the amount paid on cattle in 1865 being \$723, and in 1866, \$1,698. The premiums offered in this division are as encouraging as those offered by any other State Society, and should certainly stimulate a general improvement in our neat stock. In other classes the increase was not as large, but the full effects of the liberal measures adopted by the Society, have not yet been felt. Experience for a number of years, indicates that from one to two years are required to pass before any change in the premium list becomes generally known and understood by the community most interested. In the division of fruit, the Society, at its last annual meeting, inaugurated a new class of collections from Congressional districts, which called out a very magnificent exhibition, in fact, one heretofore unequalled for its display of the products of the orchards of Michigan, yet it is well known that the competition would have been much greater, and the exhibition decidedly superior, had the new class been thoroughly known to fruit collectors. It is to be hoped that this class will be continued without any important change.

The adoption of a class of premiums for farms and their examination seems to have met with much favor. It might be well, however, to consider whether, in this State, it may not be proper to adopt a system of classification which would stimulate improvement in new settlements, by offering premiums which would be so arranged as to permit farms in new and little improved localities to compete only with each other, and not with the farms in older sections where improvements by the use of labor, capital and time have given advantages which cannot be within the reach of new settlers.

For the premiums offered for crops, the awards of which are to be made at the winter meeting of the Executive Committee, there are fourteen entries. Only a few of these have been

accompanied with the statements requisite to enable the committee to decide on their merits.

All of which is respectfully submitted.

R. F. JOHNSTONE,

*Secretary.*

Mr. Baxter moved that the address of the President be referred to a special committee of three members, for the purpose of referring the recommendations contained in it to appropriate committees, which was adopted.

On motion of Mr. Baxter, the report of the Treasurer was referred to the committee on finance.

The committee then went into committee of the whole on the improvement of horses in the State, and visitors and citizens participated in the discussion.

The committee adjourned to 9 o'clock on Wednesday morning.

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## SECOND DAY—MORNING SESSION.

WEDNESDAY, Jan. 16—9 o'clock A. M.

The committee met, the President in the chair.

The minutes were read and approved.

The President appointed the following committees:

*Special Committee on Reference of President's Address.*—Messrs. Baxter, Dorrell and Bort.

*Finance Committee.*—Messrs. Baxter, Sterling and Willcox.

*On Premium List.*—Messrs. Greene, Baker, Allen and Phillips.

*On Rules.*—Messrs. Bailey, Fisk and Gilbert.

On motion of Mr. Greene, the report of the viewing committee on class 16, was corrected so that William Hemmingway's name should appear as one of the committee.

The Secretary submitted several letters in reference to claims for premiums, with the reports of the viewing committees relating thereto.



On motion, these letters were referred to a special committee consisting of Messrs. Walter, Barker and Gilbert.

Mr. Baxter made a report on the reference of the subjects recommended in the President's address, and submitted the following resolutions:

*Resolved*, 1. That so much as relates to the finances of the Society, be referred to the committee on finance.

2. That so much as relates to the Agricultural College, be referred to a committee to consist of three members.

3. That so much as relates to change in the action of the Society, with regard to trials of speed of horses during the annual exhibition, be referred to the committee of the whole.

4. That so much as relates to conventions for the encouragement of general agriculture, wool-growing, and other kindred objects, be referred to the committee on conventions and discussions.

5. That so much as relates to premiums on cattle, horses, sheep, fruits, etc., be referred to the committee on premium list.

6. The committee would further recommend that the subject of the Agricultural Museum, in connection with the State Normal School, at Ypsilanti, (not referred to in the President's address,) be referred to a special committee of three, either the same committee recommended on the Agricultural College, or another committee, as the Executive Committee may deem best, with authority to report what, if any, action should be taken on the subject.

On motion, the report was accepted and the resolutions adopted.

*Ordered*, That the subject of the Agricultural Museum, be referred to the same special committee as may be appointed on the subject of the Agricultural College.

On motion of Mr. Walter, Mr. James Berry, of Adrian, had leave to make a verbal statement of his claim for a drawback on his agreement for the purchase of lumber sold him at Adrian.

On motion of Mr. Barker, the claim of Mr. Berry was referred to a special committee, consisting of Messrs. Sterling, Gilbert and Dorrell.

The committee voted a recess, and the several standing and special committees took up the consideration of the subjects committed to them.

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## SECOND DAY—AFTERNOON SESSION.

WEDNESDAY, JANUARY 16—2½ o'clock P. M.

The committee met.

Mr. Taft, President of the Michigan Sugar-Growing Association, addressed the committee on the propriety of holding a convention of the sorghum-growing interests in connection with the State Agricultural Society, at such time and place as might be agreed upon.

Mr. Richard, of Tecumseh, submitted a proposition from Tecumseh for the consideration of the committee.

On motion, the subject was referred to the Committee on Conventions.

The Secretary presented the following reports of crops, as entries for the premiums offered by the Society:

B. J. Bidwell, of Tecumseh—One-half acre of carrots, one-half acre of ruta bagas, one-half acre of mangel-wurtzels, one-half acre of sugar beet.

E. H. Winans, of Adrian—Two acres of vineyard.

T. B. Tooker, Norvell, Jackson county—One orchard of apples, 300 trees.

Samuel Rappelye, Tecumseh—One orchard of apples, (over 50 trees,) five acres of potatoes, five acres of oats, one acre of buckwheat.

Francis Coates, Ridgeway—Five acres of oats.

Peter Coller, Adrian—One orchard of apples.

E. N. Willcox, Detroit—One crop of carrots, one crop of rutabagas.

C. W. Greene, Farmington—Five acres of potatoes, tile drained field of 25 acres.

The President presented a letter from the Hon. Oramel Hosford, informing that the State Board of Education had voted to accept the offer of \$1,250 for the completion of the Agricultural Museum Building on the State Normal School grounds, on the conditions proposed by the Executive Committee of the State Agricultural Society.

Mr. Baxter, from the Committee on Finance, reported that the committee had examined the reports and vouchers of the Treasurer, and had found the same correct. They would recommend, however, that in all cases that vouchers should be made out for reference, and that the Secretary be directed to have blanks prepared and kept on hand as may be needed for such purpose.

The report was accepted and adopted.

Mr. Walter, from the Committee on Protests, reported as follows: That they had examined the reports of the several Viewing Committees with care, and the statements submitted to them, and have unanimously concluded to submit the following resolutions:

1. *Resolved*, That the report of the Committee on Farm Wagons remain unchanged, there having been no award recorded to Messrs. Chase and Pierson, of Sturgis, on farm wagons.

2. *Resolved*, That the premium on five yoke of working oxen be paid to H. Tabor, it] having been shown that the award to Benjamin Kelly was a clerical error of the Viewing Committee in making the award to the] wrong number, and the Secretary is hereby directed to request] Mr.] Kelly to refund the amount paid to him.

3. *Resolved*, That the awards of the Viewing Committee on Stump-pullers be sustained, the report having been examined and sustained at the time of the fair.

The report was accepted and the resolutions adopted.

The President appointed as the Committee on Conventions—  
Messrs. Baxter, Gilbert and Walter.

The committee adjourned till evening.

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## SECOND DAY—EVENING SESSION.

WEDNESDAY, Jan. 16—7½ o'clock P. M.

The Committee met.

Mr. Baxter, from the Committee on Conventions, made the following report and resolutions:

*Resolved*, That a general convention of the agriculturists of the State be held at such a place as will agree to the best terms, to defray the expenses of such meeting on the 14th of February next, and that the State Wool-Growers' Association be invited to unite with the State Agricultural Society in such convention.

*Resolved*, That a convention of the Michigan Sugar-Growers be held at Tecumseh on the 20th and 21st of February, provided that the citizens of Tecumseh will furnish a hall and raise the amount of money to pay the necessary expenses of such convention.

The report was accepted and the resolutions adopted.

Mr. Bailey, from the Committee on Rules and Regulations, reported as follows:

The committee recommend that rule 5 be amended by adding the words "and tickets for each day's actual attendance."

That rule 7 be amended by striking out all after the word "from," in the last line, and adding the words "the superintendent of the class to which the animal or article belongs."

That rule 10 be amended by striking out the words "entitled to," and substituting the words "examined for;" and by leaving out all after the word "except," and adding "it is shown that an unavoidable delay has been caused by circumstances beyond the exhibitor's control."

That rule 15 be amended by adding the words "and all exhibitors of native and fat cattle will be required to hand to

the chairman of Viewing Committee a statement of age and mode of keeping said animals."

That rule 2, for general action of committees, shall read: "The Superintendent of each department shall furnish to the chairman of the committee of each class in his department the committee books to be used by the several committees, and;" also, substitute the word "each" for "said."

That section 1, under general rules in relation to horses and cattle, be stricken out.

On motion, the report was accepted and the amendments adopted.

On motion of Mr. Greene, the reports on field crops were taken up for consideration.

The reports of Mr. Rappelye and Mr. Tooker were read.

On motion of Mr. Baxter,

*Resolved*, That the reports on orchards do not comply with the rules of the Society, and that no award be made on said class.

The report of Mr. Rappelye on five acres of potatoes, was read.

On motion of Mr. Baxter,

*Resolved*, That the report does not furnish the information required by the rules of the premium list, and that the awards shall not be made.

The report of Mr. Greene on the best tile-drained field, of not less than ten acres, was read, and the report accepted.

*Ordered*, That the premium be paid.

The report of Mr. Greene, on five acres of potatoes, was read.

On motion of Mr. Baxter,

*Resolved*, That on the presentation of the proper affidavits and statements of measurement, as required by the rules, to the Secretary, that the award for the best crop, be made to Mr. Greene.

On motion of Mr. Baxter,

*Ordered*, That the rules in relation to winter crops, be

changed so that all exhibitors shall be required to forward their reports previous to the 1st of January, and that no reports received after that date will be acted upon.

The President appointed as committee on the subject of the Agricultural College, Messrs. Baxter, Howard and Dorrell.

Mr. Greene, from the committee on premium list, reported in part as follows:

That the classes and premiums from 1 to 5, remain as in last year's list.

That the class for herds be stricken out.

Mr. Johnstone moved that the report be amended so that the premium be made \$50, instead of \$100. Adopted.

That the premium for five yoke of working oxen be stricken out.

That the herd of fat cattle be reduced to five in number.

Mr. Humphrey moved that the premium on fat cattle be stricken out. Lost.

The premiums for milch cows were stricken out.

Add to class for thoroughbred horses and part thoroughbreds, as follows:

For best mare, four years old or over, without colt,..... \$20 00

For second best mare, four years old or over, without colt,..... 10 00

Add to rule for horses of all work, the words, "nor less than 1100 pounds in weight."

Strike out the words "in the State," in rule under trotting stallions.

Mr. Fiske moved that a class of premiums be offered for two-year-old trotters, which elicited much discussion, and, after being adopted, was reconsidered and stricken out.

Mr. Willcox moved that the following premiums be offered in the trotting class, in place of section for matched trotters:

For the best pair of driving horses, owned by exhibitor, and not used for sporting purposes, to be exhibited under direction of Superintendent in charge,.....\$50 00

For the second best pair of driving horses owned by exhibitor, and not used for sporting purposes, to be exhibited under direction of Superintendent in charge,..... 20 00

The committee adjourned to Thursday morning.

## THIRD DAY—MORNING SESSION.

THURSDAY MORNING.

Committee met, and adjourned to visit the farms and stock of K. C. Barker and E. N. Willcox.

## THIRD DAY—EVENING SESSION.

THURSDAY EVENING.

Committee met.

Mr. Willcox moved that a premium be added to the class of cattle, as follows, which was adopted:

For the best Shorthorn Bull, to be exhibited with four yearlings, bred from him,.....	\$50 00
For the second best Shorthorn Bull, to be exhibited with four year- lings bred from him,.....	25 00

Mr. Howard offered the following resolution, which was passed:

*Resolved*, That as a valuable medium for disseminating useful information on agriculture, and the arts therewith connected, this committee cordially recommend the *Western Rural*, a weekly paper published in Detroit, by H. N. F. Lewis.

Mr. Johnstone offered the following resolution:

*Resolved*, That a class of premiums on farms be offered, to be awarded under rules and conditions similar to those adopted last year.

Mr. Wells moved that an amendment be made, offering a premium of \$100, to encourage the setting out and propagation of trees. Not adopted.

Mr. Baxter moved that the premiums on farms be stricken out. Not adopted.

The resolution was referred to the committee on premium list.

Mr. Baxter, from the committee on the address of the President, relating to the State Agricultural College and the Agricultural Museum, made the following report:

The committee to whom was referred that part of the President's address relating to the State Agricultural College, and the subject of the Agricultural Museum, in connection with the State Normal School, at Ypsilanti, would respectfully report:

That they heartily endorse the remarks and suggestions of the President in relation to the Agricultural College. Whatever differences of opinion may have existed with regard to the location of the institution, there has been no question as to its importance and usefulness, and the duty of this Society, as representing the agricultural interests of the State, to render it all the encouragement and assistance in its power, to meet the wants, the wishes and the reasonable expectations of the agriculturists of the State. Your committee are of opinion that no good would result from any further discussion as to the propriety or impropriety of its location, as many of the objections heretofore urged are gradually losing somewhat of their force by reason of the rapid growth and development of that section of the State and the opening of new lines of railroad connection, and we may regard the question of location as settled. Your committee, therefore, believe it the duty of this Society to unite most cordially and heartily with the State Board of Agriculture in endeavoring to dispel popular prejudice—to arouse popular interest, and in winning to its support all the agriculturists of the State.

Your committee believe that much good may be accomplished by the appointment of such a committee as is proposed by the President, and therefore recommend that a committee of three (of whom the President shall be chairman,) be appointed by the Executive Committee of the Michigan State Agricultural Society, to meet a like committee to be appointed by the State Board of Agriculture, and that said joint committee ask a conference with a committee of the Legislature of the State of Michigan, that the wants and wishes of the Agricultural College may be properly presented to the Legislature, and proper and needed legislation secured.

Your committee would further represent that the Agricul-



tural Museum, in connection with the State Normal School, at Ypsilanti, is still unfinished for want of funds; that the appropriations made by your Society, and by the State Board of Education have been carefully and prudently expended, but that the unprecedented cost of labor and materials for the past four years have rendered the appropriation entirely insufficient for the completion of the building. Your committee believe no argument is necessary to show the utility and importance of such a museum, or to enforce the propriety of securing its completion, but aware that the finances of your Society may not be thought to warrant further appropriation at present for that object, they would recommend that this Society unite with the State Board of Education in presenting the matter to the attention of the Legislature, and in securing from them such an appropriation as will enable them to complete the Museum building. The State Board of Education being entirely dependent on legislative appropriation for funds to carry on the Normal School, and such appropriations having been hardly sufficient to meet the ordinary expenses of the school, it will not be possible for them to deduct any portion of the ordinary fund to the completion of the museum. Indeed, your committee believe the Normal School, in proportion to the funds appropriated to its support, educates and sends out as thoroughly disciplined and well instructed teachers, a larger number of young men and women than any other educational institution in the State, and that the thanks of the Society and the entire agricultural community are due to them for their efforts, by the establishment of an agricultural museum, in connection with the school, to send forth teachers prepared, in addition to the usual branches of education, to give instruction of particular and especial benefit to agriculturists.

Your committee therefore recommend that the special committee already provided, confer with a like committee to be appointed by the Board of Education, and that said joint committee endeavor to secure from the Legislature the requisite appropriations.

Your committee have been gratified to notice the position taken by the Executive of the State in relation to the Agricultural College, and other institutions of learning, and also the cordial sympathy that exists between the President of the Michigan University and all these institutions, and they are satisfied that if these subjects can be properly presented to the Legislature, that there will be on their part no lack of sympathy and support, and the adoption of the following resolutions, embracing the substance of the foregoing recommendations, is commended to your consideration :

*Resolved*, That the Agricultural College of Michigan is now giving substantial evidence of its progress toward a realization of what was contemplated in its original creation under the provisions of our constitution, and that we regard it as one of the instrumentalities that is placing the science of practical agriculture in the same honorable position that our University is conferring upon law and medicine, and our Normal School on the profession of teaching.

*Resolved*, That we again recommend to the authorities of the College a course of lectures on agricultural and kindred subjects during the winter months, satisfied, as we are, that they would be largely attended by a class of farmer's sons who are partially released from the labors of the farm at that season of the year.

*Resolved*, That we are satisfied that the industrial interests of Michigan will be subserved and promoted by liberal appropriations on the part of the Legislature for the support of the Agricultural College, including items for a winter course of lectures, as specified in the foregoing resolution, and also the necessary enlargement of its buildings to meet the increasing wants of the institution; and also such appropriations as are required by the Normal School to enable the State Board of Education to complete and furnish the Museum building, that it may be rendered available for the purposes of the school.

*Resolved*, That the special thanks of this Society and of the producing classes of the State are due to Gov. Crapo for his

able presentation of the agricultural and manufacturing interests of Michigan in his message to the Legislature, and for his special commendation of the Agricultural College to their liberal support.

*Resolved*, That we commend the generous sympathy manifested by President Haven, of the Michigan University, in his address delivered before the members of the Legislature, on their invitation, in commending to their fostering care and patronage, as well the Agricultural College and State Normal School, as the University of Michigan and kindred institutions, all necessary and desirable, with no rival interests, but all essential agents in promoting the great educational interests of the State.

On motion, the report and resolutions were accepted and adopted.

Mr. Dorrell offered the following resolution, which was adopted:

*Resolved*, That the Executive Committee of the Michigan State Agricultural Society respectfully recommend to his Excellency Governor Crapo, that S. O. Knapp, Esq., of Jackson, be appointed a member of the State Board of Agriculture, to fill one of the vacancies occurring by expiration of term.

The recommendation was sustained by remarks from H. G. Wells, Esq., of Kalamazoo, by Judge Douglass, of Grosse Ile, by M. Dorrell, of Jackson, and R. F. Johnstone, of Detroit.

The committee adjourned till to-morrow morning at 9 o'clock.

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#### FOURTH DAY—MORNING SESSION.

FRIDAY, JANUARY 18, 1867.

The Committee met. The President in the chair.

Mr. Sterling, from the special committee on the claim of James Berry, of Adrian, reported as follows:

Your committee find on examination of the subject, and the testimony submitted, that a mistake or error occurred in com-

puting the amount of lumber sold to Mr. Berry, of Adrian, and that the purchase having been made on such misunderstanding, justice requires that a reasonable deduction should be made. The following resolution is therefore submitted:

*Resolved*, That a deduction of twenty-five per cent. be allowed and made upon the notes now due, and that the Treasurer be and is hereby directed to endorse the same on said notes.

Mr. Baxter moved to amend the resolution, substituting forty per cent. in place of twenty-five per cent., which was adopted, and the resolution agreed to.

The committee on the premium list reported as follows:

That the classes of thoroughbred merinos and of Michigan fine wools be stricken out, and that there be but one class to be entitled Spanish Merinos, in which the premiums shall be double the amount offered last year.

A motion was made to amend by restoring the thoroughbred class, but was voted down.

A motion was made also to retain the class of Michigan fine wools, but it was not sustained.

In Division D a few unimportant changes were reported.

In Division E the premium of \$25 for the best twenty-five bushels of white wheat was stricken out.

No change was made in Divisions F, G, H and I.

In Division L the committee recommend the following premium on farms:

For the best cultivated and most skillfully managed farm of not less than one hundred and sixty acres in extent, a premium of \$100.

The competitors for this premium, which is to be reported on and awarded at the Annual Session of the Board at the next Winter Meeting, are required to make their entries with the Secretary, at his office in Detroit, by letter or otherwise, on or before the 4th day of July, 1867.

The examination of the farms will include—

1. The condition of the surface with regard to its division

into fields, its improvement, and the system of cultivation adopted by the owner.

2. The farm-house and out-buildings, so far as is necessary for the convenience of the farm and farm stock.

3. The amount of drainage and the improvement caused by open or under drains.

4. The number, breed and quality of the live stock maintained.

5. The amount and condition of the crops, and method of tillage for the last past and present years, including products of orchards, nursery, and all other sources of revenue.

6. The net returns over the above expenses, exclusive of nursery, garden and orchard products, which should be reported separately.

Mr. Baxter moved to amend the report by striking out the class of premiums on farms.

Decided in the negative.

The report was adopted as amended.

On motion of Mr. Phillips, the following resolution was adopted:

*Resolved*, That Mr. Stone, of Guelph, C. W., and Mr. Samuel Thorne, of New York, be invited to attend the next State Fair and serve on the Committee on Shorthorns.

The Committee then went into Committee of the Whole to nominate Viewing Committees. After proceeding with the nominations for some time,

Mr. Baxter moved that a rule be adopted that not more than three names be presented from any one township, ward or village by any one member. Adopted.

On motion, Mr. Gilbert was appointed Resident Committee on the Agricultural Museum at Ypsilanti.

On motion of Mr. Baxter, the Committee on the Agricultural College was made five instead of three.

The President nominated Mr. Baxter, Mr. Walter, Mr. Sterling and Mr. Humphrey as the committee, the President being chairman.

*For Business Committee*—Mr. Walter, Chairman; Mr. Baxter and Mr. Barker.

The President designated as Superintendents of the several departments the following members:

*Cattle, Sheep and Swine*—Mr. Phillips and Mr. Howard.

*Horses*—Mr. Barker and Mr. Greene.

*Floral Hall*—Mr. Baxter and Mr. Sterling.

*Mechanics' Hall*—Mr. Willcox.

*Fruits and Flowers*—Mr. Bort and Mr. Gilbert.

*Manufactures*—Mr. Bailey and Mr. Fisk.

*Implements and Machinery*—Mr. Dorrell.

*Implements and their Trials*—Mr. Allen.

*Police*—Mr. Walter.

On motion of Mr. Baxter, it was resolved that the President and the Business Committee be the committee to receive proposals for the next State Fair, and to designate where it shall be held.

On motion, it was ordered that the subject of an annual address be committed to the President, with power.

On motion, Mr. Humphrey was appointed a committee on tickets.

On motion of Mr. Barker, Mr. Willcox, of Detroit, had permission to make a statement relative to his entries of root crops, and he then withdrew his entries.

On motion of Mr. Baxter,

*Ordered*, That the subject of holding a general Agricultural Convention in connection with the Wool-Growers' Association be committed to the Secretary, who is authorized to make the necessary arrangements.

On motion of Mr. Willcox,

*Ordered*, That the subscription to the citizens' premiums for trotting and running horses shall not exceed one thousand dollars.

Mr. Baxter offered the following resolutions:

*Resolved*, That this Executive Committee have visited the farm of K. C. Barker, Esq., and have derived great satis-

faction from the inspection of his large stables of trotting stock, with which he is aiding to improve the horses of this State, and that we tender to him our congratulations on his success, and our hearty thanks for the invitation and for his attentions and hospitalities.

*Resolved*, That this Executive Committee tender to E. N. Willcox, Esq., their special thanks for his invitation and his generous attentions and hospitality while visiting his farm of Whitewood, and that they have examined his breeding stock of thoroughbred horses with much pleasure and satisfaction, and sincerely wish him every success in his attempt to contribute to the improvement of the horse in Michigan.

On motion of Mr. Baxter,

*Ordered*, That Mr. Walter be authorized to effect a settlement with the Spring Brook Association of Adrian.

On motion of Mr. Barker,

*Ordered*, That the discretionary premium awarded to C. W. Greene, of Farmington, at the last State Fair, be paid.

On motion of Mr. Baxter,

*Ordered*, That Mr. Bort, of Niles, be appointed a delegate to represent this Society at the Convention of the American Pomological Association at St. Louis.

On motion of Mr. Gilbert, a vote of thanks was passed to the President, Secretary and Treasurer, for their action during the past year.

On motion of Mr. Greene,

*Resolved*, That the thanks of this Committee be tendered to Mr. Lyon, of the Michigan Exchange Hotel, for his attentions and courtesy in providing for our accommodation.

On motion of Mr. Walter, the Committee adjourned to meet at the house of K. C. Barker, Esq., at 8 o'clock, p. m.

## FOURTH DAY—EVENING SESSION.

FRIDAY, January 18, 1867—8 o'clock, P. M.

The Committee met.

On motion of Mr. Greene, the following resolution was passed:

*Resolved*, That the next Annual Exhibition shall be held on Tuesday, Wednesday, Thursday and Friday, September 10th, 11th, 12th and 13th, at such place as may be designated by the committee having that subject in charge.

On motion of Mr. Barker, it was resolved to reconsider the premiums on Fine Woolled Sheep.

The President moved that the class of premiums for Michigan Fine Wools be restored to the premium list, and adopted as in last year's list. Adopted.

The Executive Committee adjourned.

R. F. JOHNSTONE,

*Secretary.*

## REPORT ON THE EFFECTS OF THOROUGH DRAINAGE.

In all business transactions where capital and labor may be judiciously concentrated at a given point, by the formation of stock companies, or by well organized associations, such as usually direct the business of manufacturing, trade and commerce, where every movement radiates from one center, and where every interest is harmoniously united, it is not difficult to calculate or determine results, nor is the goal of success seen far in the distance.

But unfortunately the agricultural interest of this country, as yet, is in possession of no such advantages.

Agriculturists have long since felt the force of concentrated capital and unity of action combined, but have not been able to wield that power in their own behalf, nor to protect themselves against its crushing influences.

The acres we till are counted by millions, covering or extend-



ing over a vast area of territory, divided by mountain ranges, stretching through a diversity of climate, limited only by seas and deserts, dependent on uncertain markets at different points, not unfrequently at inconvenient distances; we vie with each other in the productions of material wealth, and then, without concert of action, forced into competition with each other upon the market, we too frequently perform the role of underbidders at the sale, thereby causing and witnessing our financial destruction.

These are some of the evils to which we are subjected, wrongs which press with ponderous weight upon us, but how, or when these difficulties under which we now labor are to be removed or overcome, I leave for the wisdom of others, or the future to determine.

If we are to continue our individual efforts single-handed, unaided by combined skill and concentrated capital, against those organized monopolies which are attached to other branches of trade and industry, we shall need to base and conduct our diversified and fragmentary operations upon principles of sound policy, with an eye single to practical results.

In agricultural pursuits there are, at least, three primary considerations, applicable to all cases in connection with successful cultivation, viz: draining, manuring and tillage.

It is the object of this report more particularly to call attention to the first, referring briefly to some experiments, observation and final results.

This subject is not introduced for its novelty, it is not new in theory, yet I apprehend its beneficial results are not appreciated in this country.

Arguments or extended remarks upon the value of drainage, in this connection, are uncalled for, it being a question without a negative, its feasibility and importance having long since been established upon scientific principles and reduced to successful practice by the leading agriculturists of all Europe.

In this country we hear some inquiry and much talk about

reclaiming waste places, reducing adhesive or clayed soils, and renovating worn lands by stocking down, or taking up with certain prescriptions thrown in, such as lime, plaster, salt, alkalies and other composite mixtures, all well in their places, if properly applied to soils prepared to receive them, while drainage, the first and primary consideration, the basis upon which all future successful operations must depend, is ignored, or treated with blind indifference and total neglect.

But the question is often asked by the uninitiated, is all this expense and precision necessary, and will it pay?

I apprehend that where there is a superabundance of surface-water flowing in from above, or springs breaking out from beneath, no healthy vegetation can exist, and that it is the only remedy.

That in adhesive or clay soils it is the only process of thorough amelioration, rendering the parts friable and in proper condition.

That in worn or reduced lands, where the vegetable mold has been exhausted, it becomes necessary, preparatory to deeper tillage, more surface soil being required while it is being restored to its original fertility. In short, all the benefits derived from a thorough drainage in other countries is applicable to this, with some additional advantages. The growing season with us being short, by this process we may practically gain from two to three weeks in bringing forward and ripening our produce, which, in the aggregate, would add thousands, perhaps millions of dollars, to the wealth of the State.

The question may be asked, do all our lands require such preparation? Perhaps not, but I imagine the quantity of land that would not be improved by such a system of manipulation, is much less than is generally supposed.

It is my conviction that one-half of the improved land, comprising at least five counties on the eastern border of this State, will not pay four per cent. on the capital invested, until thus treated, and that every acre in said counties would be improved

by the process, in the aggregate, over and above all expenses, within the space of five years.

In answering the question, "will it pay?" and in complying with the rules of our Society, concerning reports of this kind it is obligatory that a minute, detailed account be given of the field or parcel of land entered in competition for your society's premium, both as to location and condition previous to draining, the manner of doing the work, and the final result, which is as follows :

The tract or parcel of land is situated on the east side of what is known as the Gravel Ridge. It is comparatively level, with slight inclination to the south-east. Soil very diversified, sand, gravel, loam, and vegetable mold prevailing, all resting on clay subsoil, but varying from one to ten feet in depth.

Mounds or bog springs of the most troublesome character frequently appear, from one to five feet above the surface level.

Three separate water-courses break out from the ridge above, and spread out into swales or basins, varying from ten to twenty rods in width.

These swales were formerly productive of the coarsest vegetation, viz: bog-grass, flags, rushes, and other worthless rubbish.

My method of reclaiming this field, and all other lands like conditioned, is by under-draining with sole-tile.

The following statement, with the draft annexed, represents the plan and mode of operations:

The field or parcel of land referred to was first surveyed, and stakes set, noting the distance from point to point. The relative condition of the surface as to elevation or depression was then ascertained by the use of a level. Other things being equal, the lowest depressions which would admit of the longest cuts, were selected for the principal or main drains, running parallel to each other, ranging from thirty-three to thirty-six feet apart, according to the condition of the land, or the amount of water to be supplied by side-cuts or collateral drains.

The side-cuts or feeders, are placed at such a distance apart

as the condition of the land and the necessity of the case would indicate, connecting with the main drains at any angle, less a right angle, according to circumstances.

The branches were cut about fifteen inches wide at the top, and from three to five inches at the bottom, according to the size of the tile used, and not less than three feet in depth.

Five inch tile were used for the main drains, and three inch for the collaterals.

The bottom of the ditch was made even, the inclination corresponding to the fall or descent required.

The tile were then evenly laid upon the bottom of the ditch, and the joints having been well pressed together, a light covering of straw was thrown in upon the tile to prevent the sand washing into the joints of the tile, previous to the earth being firmly settled around them.

The ditches were filled by the use of a plow and scraper, where the earth was sufficiently firm to permit the team to stand, and the shovel in all other cases.

This field contains twenty-five acres of land, and eight hundred rods of sole tile have been laid down in the manner above described, at an expense of about sixty cents per rod, or four hundred and eighty dollars in the aggregate.

The following figures represent results for the years 1865 and 1866 respectively, including the expense of seed, cultivation harvesting, and interest on land valued at seventy-five dollars per acre, and I submit the same respectfully in answer to the query, "Will it pay?" For the year 1865, the field was divided into three parcels, and planted as follows: Two acres in wheat, nine acres in potatoes, and fourteen in corn.

## FOR THE YEAR 1865.

## DR.

To two acres of Wheat, .....	\$40 00	
To nine acres of Potatoes, .....	190 00	
To fourteen acres of Corn, .....	180 00	
To Interest on same in the aggregate, .....	131 25	
		<hr/> \$541 25

CR.	
Two acres Wheat, eighty bushels, \$2 per bushel,....	\$160 00
Straw, three tons,.....	10 00
Fourteen acres Corn, eight hundred bushels, at 50 cents per bushel,.....	400 00
Corn Fodder, twenty tons, at \$5 per ton,.....	100 00
Nine acres Potatoes, one thousand eight hundred bushels, at fifty cents per bushel,.....	900 00
	<hr/> \$1,570 00
All expenses subtracted from page above,.....	541 25
Balance,.....	\$1,038 75
The cost of Drainage deducted,.....	480 00
	<hr/>
Leaves a balance in favor of Drainage for the year 1865, of.....	<u>\$558 75</u>

## FOR THE YEAR 1866.

CR.	
Ten acres Potatoes, one thousand eight hundred bushels, at 50 cents per bushel,.....	\$900 00
Ten acres of Corn, four hundred bushels, at 75 cents per bushel,.....	300 00
Corn Fodder, fifteen tons, at \$5 per ton,.....	75 00
Four acres Sown Corn for Fodder, ten tons, at \$10 per ton,.....	100 00
One acre Sorghum,.....	50 00
	<hr/> \$1,425 00

DR.	
Aggregate Expenses, including Interest on hand,....	550 00
	<hr/>
Giving a balance in favor of Drainage, for the year 1866, of.....	<u>\$975 00</u>

It will be observed that there is a little falling off in the yield per acre, from 1865 to 1866. This was caused by the ravages of worms and insects, more particularly the wire-worm, which is usually very destructive the second year after draining and breaking up sward-land, as they are forced to the surface for subsistence.

It is worthy of note that the early frosts of the past season, which proved so destructive generally, did not materially affect vegetation in my drained lands, while it was most destructive

in other lands adjacent. This fact alone would seem to be sufficient to arrest the attention of farmers, and offers additional inducements to further investigation upon this subject.

The above suggestions are respectfully submitted to those who are interested, hoping that none will hastily leave rich lands, good timber, pure springs, and flowing streams, until an effort is made commensurate with the privileges which surround them, and the undeveloped resources of material wealth which exist in their county at home.

The report was adopted.

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## STATE AGRICULTURAL CONVENTION,

HELD AT ANN ARBOR, FEBRUARY 14, 1867.

In pursuance of the call issued by the Michigan State Agricultural Society, a Convention of the the Farmers and Stock-Breeders of the State met at Ann Arbor on the 14th of February.

Mr. Hendricks, of Ceresco, Calhoun county, was chosen President *pro tempore*.

On motion, the following committees were appointed:

*On Permanent Organization*—Mr. Taft, of Plymouth; Hiram Arnold, Ann Arbor; John Allen, Plymouth; Mr. Bradford, Scio; J. C. Holmes, Ypsilanti.

*On Order of Business*—R. F. Johnstone, of Detroit; M. H. Goodrich, of Ann Arbor; C. W. Greene, Farmington; L. S. Wood, Lodi; Mr. Sutton, Northfield.

The Committee on Organization made the following report:

*For President*—C. W. Greene, Farmington.

*For Vice-President*—Hiram Arnold, Ann Arbor.

*For Secretaries*—C. H. Richmond and E. B. Pond, Ann Arbor.

The Committee on the Order of Business reported in part, and recommended that the following subjects be taken up in the order reported, and discussed.

1. Stock-breeding, and its general principles, with reference to domestic animals.

2. Drainage, its effects and its economy.

3. Grain-growing, and general tillage, with reference to rotation of crops.

The report being accepted and adopted, Mr. Greene was called to the chair, and in a brief address thanked the Convention for the honor conferred.

The subject of stock-breeding was discussed by the Convention, principally with regard to sheep and their treatment.

The subject of drainage having been discussed, it was moved that a committee be appointed to report on the subject to the next Annual Convention.

The President appointed Messrs. Johnstone, Taft and Allen, as such committee.

President Haven tendered an invitation to the members of the Convention to visit the University at such time as would suit their convenience.

On the afternoon of the same day, in accordance with the invitation extended by the call of the State Agricultural Society, the Convention took a recess, and the President of the State Wool-Growers' Association called the members to order, and a committee consisting of Messrs. Hendricks, of Calhoun county; Copley, of Cass; Wood, of Washtenaw; Greene, of Oakland; and Taft, of Wayne, were appointed to recommend officers for the next year.

That Committee reported and recommended that the officers who had been chosen last year should again be re-elected.

The report was adopted, and the following officers were chosen:

*President*—Hon. C. E. Stuart, Kalamazoo.

*Vice-President*—Sanford Howard, Lansing.

*Treasurer*—W. G. Beckwith, Cassopolis.

*Secretary*—W. J. Baxter, Hillsdale.

*Executive Committee*—O. W. Greene, Farmington; J. R. Hen-

dricks, Ceresco; L. S. Wood, Lodi; Charles Rich, Lapeer; N. Pugsley, Paw Paw.

The Wool-Growers' Association then adjourned, *sine die*.

The President of the Convention took the chair.

On motion, a committee consisting of Messrs. Stuart, Arnold and Richmond, were appointed to call upon the Michigan State Wool-Buyers' Association, now in session at Congress Hall, and invite the members to confer with this Convention.

Mr. Stuart, on the part of the committee, accompanied by Thomas McGraw, Esq., President of the Wool-Buyers' Association, presented that gentleman and the members to the President of the Convention. After being seated, Mr. Standish, Secretary of the Wool-Buyers' Association, presented the following communication as expressing the views of that body on the questions arising between the Wool-Growers and the Wool-Buyers:

"At a meeting of the Wool-Buyers' Association of the State of Michigan, held at Ann Arbor, in compliance with an invitation from the Michigan Wool-Growers' Association, the following preamble and rules were adopted to present to the Wool-Growers' Association, for consideration:

"Whereas, It is desirable that the Wool-Buyers and Wool-Growers of the State act in harmony in the growing, handling and disposal of wool, and shall entertain similar views as to the condition in which to put the wool of the State into market, the Wool-Buyers' Association do hereby present to the Wool-Growers' Association and Agricultural Society, the following general rules, and recommend their adoption for acceptance by the farmers of the State in preparing wool for the market:

1. That sheep should not be allowed access to straw stacks, especially barley and bearded wheat.

2. All sheep, except, perhaps, bucks, should be well washed, if practicable, in a running stream, and as early in the season as the weather will permit.

3. That sheep should be shorn, weather permitting, within six to ten days after washing.



4. At the time of shearing, the fleeces should be carefully rolled up, as snugly as possible, without the use of any boxes, with light colored, strong twine brought twice each way around the fleece, carefully excluding all dead wool and unwashed tags.

We recommend the concurrence on the part of the Growers, to the following rules, adopted by the Wool-Buyers of the State, made necessary by the similar rules of manufacturers and Eastern dealers:

1. A deduction of one-half on unwashed bucks.

2. A deduction of one-third on washed bucks.

3. A deduction of one-third on all other unwashed fleeces, unwashed wool, or excessively gummy or heavy wool, or badly cotted fleeces, or other unconditioned wool, by an excessive use of twine, and by stuffing with unwashed tags or dead wool. In purchasing wool thus prepared for market, to pay a price proportionate to its relative worth, as to texture, strength and other desirable qualities.

We believe that to conform to these rules, on the part of the growers and buyers, will largely add to the reputation and worth, as well as to the enhanced value in the price of wools of the Peninsular State, and largely increase the former preference of many Eastern consumers in securing the clip of Michigan.

J. D. STANDISH,

R. D. ALDRICH,

JOHN STARKWEATHER,

*Committee.*

After some discussion, the Convention adjourned to visit the University.

#### EVENING SESSION.

The Convention met in the evening, and the discussion of the recommendations of the Wool-Buyers Association was resumed.

Mr. Stuart offered the following as a substitute for the recommendations relative to deductions :

“Reasonable deductions should be made on unwashed or otherwise unmerchantable condition of wool, these deductions

to be determined, however, according to the quality and condition in each case, and not by any arbitrary rule of deduction to be applied indiscriminately to all cases."

This resolution opened the whole subject of the difficulties incident to the buying and selling of wool, and the want of definite understanding as to what should be denominated merchantable and unmerchantable condition, and an important discussion was held thereon. Finally the following rules were adopted:

1st. Sheep should not be allowed access to straw stacks, especially of barley or bearded wheat.

2d. All sheep, except perhaps bucks, should be well washed, if practicable in a running stream, and as early in the season as the weather will permit.

3d. Sheep should be shorn, weather and other circumstances permitting, within six to ten days after washing.

4th. At the time of shearing, the fleeces should be carefully rolled up as snugly as practicable, without being too tightly pressed, wound with light colored, strong twine, put twice each way round the fleece, carefully excluding all dead wool and unwashed tags.

5th. Reasonable deductions shall be made on account of unwashed or otherwise unmerchantable condition. This deduction to be determined, however, according to the quality and condition in each case, and not by any arbitrary rule of deduction to be applied indiscriminately to all cases.

The following resolution, on the subject of a tariff on wool was adopted:

*Resolved*, That in any tariff bill, which Congress may pass at the present session, the duties on wool ought to be equal to those proposed in the House bill of the last session.

The Convention discussed the trial of wheat, root and corn crops without arriving at any conclusions.

The following resolution was adopted:

*Resolved*, That the Wool-Growers' Convention recommend the holding of a sheep-shearing festival in the city of Jackson,

on the first Tuesday of May next, under the direction and control of the Wool-Growers' Association, and that a committee of nine be appointed, of which the President and Secretary shall be members, to make the necessary arrangements.

The following resolution was adopted:

*Resolved*, That this Convention approve of the action of the various Boards of Trade of the country in resolving to buy and sell grain of all kinds by the cental or hundred pounds, instead of by measure, and will co-operate with them in endeavoring to secure the general adoption of this system.

On motion, a committee of three was appointed to sum up the proceedings of this Convention, consisting of Messrs. Johnstone, Arnold and Starkweather, who were requested to report to the next Convention.

On motion of Mr. Allen, a committee of three was appointed to confer with committees of the State Agricultural Society, Wool-Growers' Association, and Wool-Buyers' Association, relative to calling future conventions, consisting of Messrs. Allen, Stuart and Johnstone.

Resolutions of thanks to the citizens of Ann Arbor for their liberal and cordial welcome, and to President Haven, of the University, for his attentions and courtesy, were passed, and the Convention adjourned *sine die*.

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## ANNUAL MEETING OF THE SUGAR-GROWERS' ASSOCIATION OF MICHIGAN.

### FIRST DAY.

TECUMSEH, February 19, 1867.

The annual meeting of the Michigan Sugar-Growers' Association, called by recommendation of the Michigan State Agricultural Society, was held at Tecumseh, in Bidwell Hall, on the 19th of February.

The President of the Association, Wm. Taft, Esq., of Plym-

outh, called the members present to order. Mr. Charles Smith, Secretary.

Mr. Moore, from a committee appointed at the last annual meeting, reported the draft of a constitution, which was referred to a committee consisting of Messrs. Tallman and Smith.

On motion, a committee consisting of Messrs. Richard, Tallman and Jacobs, was appointed on the order of business.

After some discussion on the progress of sorghum cultivation, the Convention adjourned.

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SECOND DAY.

WEDNESDAY MORNING, February 20.

The Convention met, and the President appointed the following committees:

*Sugars*—Messrs. Tallman, Palmer, Brown.

*Syrups*—Messrs. Lebanon, Conover, Brown.

*Apparatus*—Messrs. Benedict, Winne, Johnstone.

*Seeds*—Messrs. Weeks, Partridge, Dean.

*Samples*—Messrs. Baxter, Bidwell and Vandeventer.

Mr. Ambrose offered the following resolution, which was adopted:

*Whereas*, It is desirable to make the manufacture of sorghum sugar and syrup a practical operation; therefore,

*Resolved*, That in awarding premiums, the viewing committee shall be instructed to take into consideration the quantity as well as the quality of samples exhibited as prizes.

The committee reported on the order of business as follows:

1. Best variety of seeds for the cultivation of sugar and syrup.
2. Time and mode of harvesting, preparation and preserving of cane for manufacturing.
3. Manufacture of syrup and apparatus.
4. Manufacture of sugar.
5. The commercial position of sorghum products.
6. Cider jelly as a commercial product.

The Association proceeded to discuss the several propositions in the order of business.

At the evening session a committee, consisting of Messrs. Richard, Vandeventer and Kroh, was appointed to nominate officers for the ensuing year.

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THIRD DAY.

THURSDAY, February 21.

The Convention elected officers for the year, as follows:

*President*—Wm. Taft, Plymouth.

*Vice - Presidents*—J. L. Tallman, Adrian; A. S. Partridge, Flint.

*Secretary*—Alexander Richard, Tecumseh.

*Treasurer*—J. H. Gardner.

*Directors for one year*—J. L. Standish, Tipton; W. Hibbert, Sturgis.

*Directors for two years*—Charles Stewart, Plymouth; John Richard, Tecumseh.

Reports were received from the committees on the several articles and entries made, and the premiums were duly awarded.

The Treasurer reported that the amount received by him had been \$197 07, and that there had been paid out \$130 89, leaving a balance of \$66 18 in his hands.

R. F. Johnstone, Secretary of the Michigan State Agricultural Society, reported on the proceedings of the Convention, and submitted the following propositions as exhibiting the position of the sorghum interests as shown by the facts elicited by the discussion of the several subjects considered by the members, viz:

1. It is generally admitted that the Otaheitan variety is best for the production of sugar, and that the Chinese variety is best for syrup. We have therefore attained to a definite knowledge as to the best varieties adapted for profitable cultivation.

2. The best method for the successful cultivation of the

plant is now generally known well enough to secure a crop with certainty.

3. The most economical and safe methods of harvesting the cane, and of taking care of it when harvested are now well known, so that the valuable properties of the plant need not suffer deterioration from handling in an improper manner.

4. The best and most safe treatment of the cane, and of the expressed juice of the plant when at the mill does not seem to be definitely settled, and the practice in this respect is not generally the same among cultivators and manufacturers. More thorough examination and observation is required in this direction.

5. The rapid boiling of the purified juice of the cane over a shallow pan, affording a very full exposure of the syrup to the atmosphere, while boiling and cooling, it is definitely ascertained promotes speedy granulation under ordinary skillful management.

6. It is positively ascertained that the syrup, when skillfully treated, will readily granulate, and furnish a sugar of high, dry quality, without the introduction of foreign sugars, and that the quality of the sugar as to its strength or weakness, is determined by the skillfulness of the grower and manufacturer entirely.

7. It is ascertained with sufficient positiveness that the crop can be grown for sugar, and that the production of this article may be in quantity great enough to insure abundant profits, if treated according to the best method of practice now known.

8. That we have confidence that the method and the agents for purifying, adopted and discovered by Dr. Clough, of the *Sorgho Journal*, are destined to bring the products of the sorghum into trade as an article of commerce.

9. Cultivators, manufacturers and each member of this Association should be prepared to record their observations, and to report the results they may arrive at during the coming year, at the next annual meeting.

The Convention adjourned, with a vote of thanks to the citizens of Tecumseh, for the hospitable reception the members had met with.

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**GENERAL PROCEEDINGS OF EXECUTIVE COMMITTEE  
DURING THE ANNUAL EXHIBITION OF 1867.**

EXCHANGE HOTEL, }  
DETROIT, Sept. 11, 1867. }

The Executive Committee met, President Beckwith in the chair, a quorum being present.

Reports being called for, Mr. Phillips, of the cattle department, stated that it was claimed that a cow and heifer exhibited by Wm. Smith, of Detroit, were not breeders, and should not be allowed to compete; whereupon, Mr. Uhl and Mr. Smith having stated the case, it was

*Resolved*, That the premiums awarded in these two entries, be withheld until evidence has been given that the cow and heifer referred to are in calf, or have proved to be breeders, and that the premiums be awarded in accordance with the directions of the viewing committee.

The several superintendents reported from their departments, and action was taken on the programme of the next day.

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THURSDAY, Sept. 12, 1867.

The committee met at the Exchange Hotel, the President in the chair. A quorum was present.

On motion of Mr. Phillips, *Ordered*, That a diploma and medal be awarded Mr. Cole, of Batavia, N. Y., on his herd of Devon cattle, in place of a part of the money premiums awarded, as a mark of the merit of his fine stock exhibited.

On motion of Mr. Greene, *Ordered*, That a premium of \$50 be awarded for a herd of Ayrshire cattle, as on other classes,

if a herd is exhibited which are meritorious and declared worthy.

A protest of several exhibitors in the class of horses of all work, was presented and read.

After explanation, on motion of Mr. Greene, *Ordered*, That the protest be laid on the table.

An account of Mr. D. Brown, for services at the fair of 1861, was considered and laid on the table.

The request of certain exhibitors of sewing machines, that no committee be appointed to decide on the merits of sewing machines was heard, and after discussion, was not agreed to.

The reports of the several superintendents were heard, and the programme for the next day agreed upon.

The treasurer reported that he had received up to date, \$5,768.

Mr. Baxter called up the consideration of an award for a sewing machine, made to the Willcox & Gibbs Sewing Machine Company, in 1865, and the subject was referred to a special committee, consisting of Mr. Baxter and Mr. Sterling, to report upon at the next meeting.

Adjourned.

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FRIDAY, Sept. 13, 1867.

The committee met at the Michigan Exchange, Detroit. The President in the chair. A quorum was present.

Mr. Baxter, from the committee to which was referred the consideration of the award on the Willcox & Gibbs Sewing Machine, in 1865, reported that it must be allowed; that owing to a doubtful reading of the premium list, some injustice had been done this company, and he would therefore recommend the adoption of the following resolution:

*Resolved*, That the Secretary be directed to procure a gold medal, and that the same be awarded to the Willcox & Gibbs Sewing Machine, to rectify errors made in the awards in this class in the years 1865 and 1866.



The resolution was adopted.

On motion of Mr. Greene,

*Resolved*, That the premium be awarded to Mr. J. D. Perry, on his draft horse, time not having been allowed for the viewing of the section of the class in which he was entered.

On motion of Mr. Baxter, *Ordered*, That the Secretary be authorized to award to Messrs. Ling & Chandler, a diploma for the best organ of Michigan manufacture.

On motion of Mr. Allen,

*Resolved*, That a medal be awarded to the three-horse clevis exhibited by Mr. Dennison, of Kalamazoo.

On motion of Mr. Dorrell,

*Resolved*, That a medal be awarded to the one-horse railroad horse power, exhibited by R. L. Howard, of Buffalo.

On motion of Mr. Baxter,

*Resolved*, That the thanks of the Executive Committee are tendered to the Metropolitan Police, of the city of Detroit, for the efficient services rendered to the State Agricultural Society during the annual fair.

On motion of Mr. Sterling,

*Resolved*, That the thanks of the Executive Committee are due, and are hereby tendered to Messrs. C. M. Welch and W. J. Sullivan, for their untiring efforts to furnish sufficient facilities for visiting the fair grounds by vessels and steamers, and for their ready compliance with the request of the committee to furnish all vessels needed beyond what were required by the terms of their contract.

*Resolved*, That considering the stage of water at the Society's dock, Messrs. Welch & Sullivan did all, and more than all that could have been reasonably demanded of them by the Society or the visitors to the fair, in a generous and liberal spirit, and with a most commendable activity and desire to aid the resources of the fair.

The Committee then adjourned *sine die*.

R. F. JOHNSTONE,

*Secretary.*

## ANNUAL MEETING.

FAIR GROUNDS, Friday, Sept. 13, 1867.

The annual meeting of the members of the Michigan State Agricultural Society, was held at the Fair Grounds, at the President's stand.

W. G. Beckwith, Esq., President, called the meeting to order, and stated that the first business of the meeting would be the election of officers for the ensuing year.

Mr. Sterling, of Monroe, moved that a committee of seven, to be selected, if possible, from each Congressional District in the State, be named by the President, to submit the names of officers to the meeting, which was adopted.

The President named as such committee, Mr. Sterling, of Monroe; P. K. Leach, of Macomb; Geo. C. Munro, of Hillsdale; E. N. Willcox, of Detroit; Geo. D. Hill, of Washtenaw; Marvin Dorrel, of Jackson, and William Bort, of Berrien.

Mr. Sterling made the following report:

Your committee, after due deliberation, report that for President, they report the name of W. G. Beckwith, of Cassopolis.

That on motion of Mr. Willcox, Mr. E. O. Humphrey, of Kalamazoo, was nominated for Treasurer.

That by unanimous consent, R. F. Johnstone, of Detroit, was nominated for Secretary.

That by unanimous consent, James A. Walter, of Kalamazoo, was nominated for the Executive Committee.

That by unanimus consent, Mr. L. S. Scranton, of Grand Rapids, was nominated for the Executive Committee.

That on motion of Mr. Willcox, and by unanimous consent, K. C. Barker, of Detroit, was nominated for the Executive Committee.

That on motion of Mr. Bort, and by unanimous consent, the Hon. Wm. Adair, of Detroit, was nominated for the Executive Committee.

That on motion of Geo. C. Munro, and by unanimous consent, W. J. Baxter, of Jonesville, was nominated for the Executive Committee.

That on motion of G. D. Hill, and by unanimous consent, John Gilbert, of Ypsilanti, was nominated for the Executive Committee.

That by unanimous consent, Dr. Manly Miles, of Lansing, was nominated for the Executive Committee.

Mr. Burtis moved the unanimous acceptance and adoption of the report, and it was accepted and adopted.

On motion of Mr. E. N. Willcox, the following resolutions were unanimously adopted:

*Resolved*, That the thanks of the members of the Michigan State Agricultural Society are due, and are hereby tendered to the President and Executive Officers, for the very able and efficient conduct of the affairs of the Society for the past year, and that their long and faithful services entitle them to our confidence, and deserve our most hearty approval.

*Resolved*, That the Executive Committee are hereby directed to fix the salary of the Secretary for the year, at not less than \$1,200, and that his faithful and energetic services entitle him to the fullest confidence and the most grateful regards of the Society.

Mr. Austin Wales, of Macomb, offered the following resolution, which was unanimously adopted:

*Resolved*, That the Executive Committee be, and are hereby directed to pay the Secretary \$600, in addition to his salary for the present year, for the efficient services he has rendered the Society the past twelve months.

On motion, the meeting then adjourned *sine die*.

Published by order.

W. G. BECKWITH,  
*President.*

R. F. JOHNSTONE, *Secretary.*

## LIST OF PREMIUMS

AWARDED AT THE NINETEENTH ANNUAL EXHIBITION OF THE MICHIGAN STATE AGRICULTURAL SOCIETY, HELD SEPTEMBER 10, 11, 12 AND 13, 1867.

## DIVISION A—CATTLE.

## CLASS I—SHORT-HORNS.

Bulls four years old and over—D. M. Uhl, Ypsilanti, De Gray, 1st premium, \$50; S. A. Cooper, Franciscoville, Hubback, 2d premium, \$25.

Bulls two years old—F. K. Bush, West LeRoy, Grand Duke, 1st, \$30; Henry Warner, Lima, Duke Balder, 2d, \$15.

Bulls one year old—H. A. Tillotson, Marshall, Sheldon's Duke, 1st, \$25; A. McNorton, Fort Huren, Nichol Jarvie, 2d, \$12.

Bull Calves—E. Curran, Washington, Mich., 1st, \$10.

Cows four years old or over—D. M. Uhl, Ypsilanti, Florence, 1st, \$50; H. A. Tillotson, Marshall, Fairy Queen, 2d, \$25.

Heifers three years old—Wm. Smith, Detroit, Rose, 1st, \$40; H. A. Tillotson, Marshall, Indian Queen, 2d, \$20.

Heifers two years old—H. A. Tillotson, Marshall, May Queen, 1st, \$30; D. M. Uhl, Ypsilanti, Florence 2d, 2d, \$15.

Heifers one year old—H. A. Tillotson, Marshall, Lady Washington, 1st, \$20; Chas. Whitaker, Lima, Lizzie, 2d, \$10.

Heifer Calves—Chas. Whitaker, Lima, Molly, 1st, \$10; R. Wadhams, Clyde Mills, Helen Clyde, 2d, \$5.

IRA H. BUTTERFIELD,  
ALLEN WARREN,  
WILLIAM WHITEFIELD,  
ROBERT ROME,

*Committee.*

## CLASS II—DEVONS.

Bulls four years old or over—Walter Cole, Batavia, N. Y., Queen Anne Huron, 1st, \$50; Calvin Pierce, Shelby, Megunticook, 2d, \$25.

Bulls two years old—John Allen, Coldwater, Oxford, 1st, \$30; Samuel Toms, Oshawa, C. W., Duke of Somerset, 2d, \$15.

Bulls one year old—Walter Cole, Batavia, N. Y., Lovely's Huron, 1st, \$25.

Bull Calves—Walter Cole, Batavia, N. Y., Helena Huron 2d, 1st, \$10; I. H. Butterfield, Lapeer, Archer, 2d, \$5.

Cows four years old and over—Walter Cole, Batavia, N. Y., Helena, 2d, 1st, \$50; Walter Cole, Batavia, N. Y., Lovely 1st, 2d, \$25.

Heifers three years old—John Allen, Coldwater, Red Rose, 1st, \$40.

Heifers two years old—I. H. Butterfield, Lapeer, Helena 2d, 1st, \$30; John Allen, Coldwater, Ida, 2d, \$15.

Heifers one year old—John Allen, Coldwater, Rose, 1st, \$20; Calvin Pierce, Shelby, Dell, 2d, \$10.

Heifer Calves—John Allen, Coldwater, Fancy, 1st, \$10; Calvin Pierce, Shelby, Rose, 2d, \$6.  
The Agricultural College presented a fine bull, two years old, not entered for competition.  
The Committee notice with pride the large number of very fine animals exhibited in this class.

EDWIN PHELPS,  
P. K. LEACH,  
HIAL P. SLY,  
J. EDWIN PHELPS,  
*Committee.*

#### CLASS III—HEREFORDS.

Bulls two years old—Edwin Phelps, Pontiac, Pontiac, 1st, \$20.  
Bull Calves—Edwin Phelps, Beadstone 2d, 1st, \$10.  
Cows four years old or over—Edwin Phelps, Pontiac, Rose, 1st, \$50; Edwin Phelps, Pontiac, Cora 2d, 2d, \$25.  
Heifers three years old—Edwin Phelps, Pontiac, Hope, 1st, \$40; Helons, 2d, \$30.  
Heifers two years old—Edwin Phelps, Pontiac, Bright Eye, 1st, \$30.  
Heifer Calves—Edwin Phelps, Pontiac, Daisy, 1st, \$10; Lively, 2d, \$5.

IRA H. BUTTERFIELD,  
*Chairman.*

#### CLASS IV—AYRESHIRE.

Bull three years old—F. E. Eldred, Farmington, \$40.  
Cow three years old—F. E. Eldred, "Fancy," \$40.  
Heifer two years old—F. E. Eldred, "Fanny," \$30.  
There was a very fine bull exhibited by the State Agricultural College, not entered for competition.

EDWIN PHELPS,  
*Chairman.*

#### CLASS V—ALDERNETS AND GALLOWAYS

Alderneys not exhibited.  
The State Agricultural College had a very fine Galloway bull on exhibition—not entered for competition.

IRA H. BUTTERFIELD,  
*Chairman.*

#### CLASS VI—THOROUGHBRED HERDS.

H. A. Tillotson, Marshall, Short-horns, 1st, \$50; Walter Cole, Batavia, N. Y., Devons, 1st, \$50; Edwin Phelps, Pontiac, Herefords, 1st, \$50; F. E. Eldred, Farmington, Ayrshires, \$50; D. M. Uhl, Ypsilanti, Short-horn bull and four yearlings bred from him, 1st, \$50.

F. FOWLER,  
W. R. SCHUYLER,  
WILLIAM WHITFIELD,  
*Committee.*

## CLASS VII—GRADE CATTLE.

William Smith, Detroit, best cow, 1st, \$15; Phelps Newberry, Detroit, 2d best cow, 2d \$10.

H. A. TILLOTSON,  
C. J. SPRAGUE,  
H. C. WILCOX,

*Committee.*

## CLASS VIII—WORKING OXEN AND STEERS.

J. D. Perry, Redford, best yoke oxen, five years old and over, 1st, \$20; A. D. Power, Farmington, 2d best yoke oxen, five years old and over, 2d, \$15; C. J. Sprague, Farmington, one pair twin calves, discretionary, \$5; J. D. Perry, Redford, best yoke trained oxen, 1st, \$10.

THOS. RICHARDSON,  
P. B. MOSHER,  
THOS. McCLUMPHA,  
D. KINNE,  
C. A. GREENE,

*Committee.*

## CLASS IX—FAT CATTLE.

William Smith, Detroit, best herd fat cattle, 1st, \$50; best pair fat cattle, 1st, \$20; best fat ox, 1st, \$10; 2d best fat ox, \$7; best fat cow, 1st, \$10; best fat steer, three years old, 1st, \$10; best fat heifer, three years old, 1st, \$10; best fat steer, two years old, 1st, \$8; best fat heifer, two years old, 1st, \$6.

J. S. NEWLAND,  
F. CURTIS,  
THOS. RICHARDSON,

*Committee.*

## DIVISION B—HORSES.

## CLASS X—THOROUGHBREDS.

Stallions four years old or over—E. Gray, Tecumseh, Lexington, 1st, \$50; H. Chappel, Detroit, Book Miranda, 2d, \$25.

Stallions two years old—H. Chappel, Detroit, C. E. Stuart, 1st, \$12.

Stallions one year old—E. N. Willcox, Detroit, Maitland, 1st, \$10.

Mares four years old or over—E. N. Willcox, Detroit, Maidstone, 1st, \$20; H. Chappel, Detroit, Ida, 2d, \$15.

Filleys three years old—H. Chappel, Detroit, Fanny Howard, 1st, \$15; Josephine, 2d, \$10.

Filleys two years old—H. Chappel, Detroit, Annette, 1st, \$10.

Filleys one year old—E. N. Willcox, Huddlestons, 1st, \$10; H. Chappel, Detroit, Alice Pool, 2d, \$5.

M. E. CROFOOT,  
E. VAN VALKENBURGH,  
A. D. BERRY,  
G. W. WATSON,

*Committee.*

## CLASS XI—HORSES PARTLY THOROUGHBRED.

Stallions four years old or over—C. A. Greene, Troy, Magna of Avon, 1st, \$20; Cady & Bingham, Milford, Eagle Eye, 2d, \$10.

Stallions three years old—K. C. Barker, Detroit, St. Albans, 1st, \$15.

Stallions two years old—K. C. Barker, Detroit, E. N. Willcox, 1st, \$10.

Stallions one year old—Y. E. Benton, Linden, Plover, 1st, \$8.

Mare four years old or over, with colt by her side—A. C. Fiske, Coldwater, Maid of Ferdbam, 1st, \$15; C. W. Greene, Farmington, Kitty, 2d, \$10.

Mare four years old or over, without foal—Harry Spencer, Novi, 1st, \$15; C. W. Greene, Farmington, Clara Barton, 2d, \$10.

Filleys three years old—K. C. Barker, Detroit, Birmingham Maid, 1st, \$10; Y. E. Benton, Linden, Florizelle, 2d, \$8.

Filleys two years old—H. A. Flint, Novi, 1st, \$8; Y. E. Benton, Linden, Lady, 2d, \$4.

Filley one year old—H. A. Flint, Novi, 1st, \$6.

M. E. CROFOOT,

*Chairman Committee.*

## CLASS XII—HORSES OF ALL WORK.

Stallions four years old and over—John Edwards, Trenton, 1st, \$50; Samuel Goodie, Pontiac, Coachman, 2d, \$25.

Stallions three years old—R. Gerard, Trenton, Gen. Grant, 1st, \$15; Dexter Riley, Farmington, French, 2d, \$10.

Stallions two years old—T. Hiesrodt, Coldwater, Independence, 1st, \$12.

Stallions one year old—A. C. Fiske, Coldwater, Dexter, Jr., 1st, \$10; 2d, \$6.

Brood mare, four years old or over, with colt by her side—Orson Ingalls, Almont, Patty, 1st, \$20; A. C. Fiske, Coldwater, Lady Allen, 2d, \$12.

Mares four years old, without foal—J. J. Nicholson, Milford, Nell, 1st, \$12; R. Gerard, Trenton, Sally, 2d, \$8.

Mares three years old—A. Wales, Erie, Highland Maid, 1st, \$12.

Filleys two years old—E. N. Willcox, Detroit, Abbess, 1st, \$12; D. Tinkham, Coldwater, 2d, \$6.

Geldings four years old—A. J. Wixom, Novi, 1st, \$12; A. Wales, Erie, Lightning, 2d, \$8.

Geldings three years old—Y. E. Benton, Linden, Colonel, 1st, \$10.

R. P. WAKEFIELD,

*Chairman Committee.*

## CLASS XIII—ROADSTERS AND TROTTING HORSES.

K. C. Barker, Detroit, best trotting stallion, 5 years old or over, with colts, "Ericson and colts," 1st, \$100; A. C. Fiske, Coldwater, do. Mambrino Chief, 2d, \$50.

Stallions four years old or over—E. C. Goodrich, Pontiac, Sleepy John, 1st, \$30; N. Alvord, Hillsdale, Black Swan, 2d, \$25.

Stallions three years old—E. N. Willcox, Detroit, Johnstone, 1st, \$20; C. E. Darrow, Dearborn, Flying Cloud, 2d, \$10.

Brood mares, five years old or over with this years' colt by her side—A. Wales, Erie, Jenny Lind, 1st, \$25; K. C. Barker, Detroit, 2d, \$15.

Mares five years old without foals—Charles Wright, Utica, 1st, \$20; C. M. Dalley, Quincy, Lady Fillmore, 2d, \$10.

Mares four year old—A. J. Wixom, Novi, "Nellie," 1st, \$12.

Mares three years old—W. Lookwood, Marshall, 1st, \$10.

Best pair driving horses not used for sporting purposes—E. D. Pierson, Coldwater, 1st, \$50; J. Montross, Port Huron, \$20.

Trotting mares or geldings—John Starkweather, Ypsilanti, Nellie Stark, 1st, \$20; S. A. Colby, Romeo, "Charlie," 2d, \$10.

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CLASS XIV—DRAUGHT HORSES.

Stallions four years old or over—J. Goodsell, Detroit, Young Rob Roy, 1st, \$30; W. F. Munger, Lobo, Ontario, Farmer's Glory, 2d, \$15.

Stallions three years old—Samuel Goodwin, Pontiac, Young Coachman, 1st, \$12.

Stallions two years old—F. B. Sibley, Detroit, 1st, \$8; F. B. Sibley Detroit, Punch, 2d, \$4.

Best pair draught horses, geldings or mares—J. Goodsell, Detroit, 1st, \$12; Albert Fisher, Oak P. O., 2d, \$10.

Your committee find two 2-year old fillies in this class not regularly entered, which we deem worthy of premium.

ORSON INGALLS,  
HARVEY SPENCER,  
JOHN THOMAS,  
A. J. DEAN,

*Committee.*

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CLASS XV—STALLIONS OF COLTS.

K. C. Barker, Detroit, best stable of colts, not over three years old, the progeny of one horse, and not less than five in number, 1st, \$50.

HIRAM CADY,  
WM. CONGDON,  
A. H. CUTTER,  
R. S. CAMPBELL,  
EBER ADAMS,

*Committee.*

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CLASS XVI—CARRIAGE AND BUGGY HORSES.

Matched carriage horses, 16 hands or over—John Starkweather, Ypsilanti, 1st, \$20; E. C. Burnett, Bronson, 2d, \$12.

Matched carriage horses, 16 hands or under—C. A. Greene, Troy, 1st, (pair mares) \$15; A. F. Burrows, Fentonville, 2d, (pair geldings) \$10.

Single carriage horses, four years old or over—H. R. Baker, Jonesville, 1st, \$8; John Button, Coldwater, 2d, \$6.

Single carriage horses three years old—H. A. Flint, Novi, 1st, \$6.

Trained saddle-horse—A. J. Wixom, Novi, 1st, \$5.

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CLASS XVII—MATCHED AND CAVALRY HORSES.

Horses 1,200 pounds and over—Samuel Rapalye, Ridgeway, 1st, \$20; Robert Lee, Farmington, 2d, \$12.

Horses under 1,200 pounds—H. Randolph, Adrian, 1st, \$12; S. A. Kellam, Pontiac, 2d, \$6.

Mares three years old—Harrison Weaver, Rochester, 1st, \$10.



Trained cavalry horses—C. W. Greene, Farmington, "Petonia," 1st, \$10; C. W. Greene, Farmington, "Diomedes," 2d, \$5.

C. W. Greene, Farmington, best five horses for cavalry purposes, \$30.

L. WOODWARD,  
*Chairman.*

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CLASS XVIII—JACKS AND MULES.

J. G. Whitney, Conneaut, Ohio, best Spanish jack, 1st, \$30; E. H. Cressey, Sandwich, C. W., jack, 2d, \$15.

Best young jack—A. C. Lemm, Nankin, 1st, \$10; E. H. Cressey, Sandwich, C. W., best jenny, 1st, \$8; J. W. Patterson, Detroit, 2d, \$6.

E. R. Spencer, Redford, best pair aged mules, 1st, \$10; F. E. Eldred, Farmington, second best pair aged mules, 2d, \$5.

F. M. MANNING,  
JOHN KENTON  
Y. E. BENTON  
*Committee.*

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CITIZENS' PREMIUMS.

Best green horse that never trotted in any sporting race, mile heats, best three in five in harness—K. O. Barker, Detroit, Joe Morris, 1st, \$100; A. Havallo, Detroit, Black Bird, 2d, \$25; time: 2:44½, 2:50, 2:44, 2:36½, 2:45; Joe Morris, winning last three heats.

Best pacing horse, mile heats, best three in five—W. H. Sullivan, Detroit, Chas. Welch, 1st, \$25; time: 2:46.

Best stallion trotting mile heats, best three in five in harness—J. D. Franklin, Jackson, Grey Eagle, 1st, \$200; Chas. Kram, Detroit, Heart of Oak, 2d, \$50; time, 2:36, 2:36, 2:38½.

Best colt or filley not over four years old, trotting mile heats best three in five—W. Wait, Thorold, Ontario, Dominion Boy, 1st, \$150; A. C. Sheley, Windsor, Ontario, Capt. Tom, 2d, \$50; time: 2:51, 2:50½, 2:55.

Best matched pair of horses, owned and driven as a double team, trotting mile heats—W. F. McLaughlin, Detroit, Stonewall and mate, 1st, \$100; H. N. Strong, Detroit, 2d, \$50; time: 3:26½, 3:14½, in the rain, track very deep.

Best horse, mare or gelding, trotting mile heats, best three in five in harness—Samuel Robbins, Detroit, Melton, 1st, \$400; W. F. McLaughlin, Detroit, Lady Ellis, 2d, \$100; time: 2:25½, 2:38½, 2:36½.

Best green horse, mare or gelding never run in any sporting race, catch weights, mile heats—A. Lawrence, Detroit, Wax Light, 1st, \$75; time: 1:57½.

Best three year old thoroughbred, running mile heats, weight for age—H. Chappel, Detroit, Fanny Howard, 1st, \$100; Geo. Quick, Novi, Josephine, 2d, \$25; time: 2:12½, 2:14.

Best thoroughbred horse, mare or gelding, running two mile heats, weight for age—W. H. Chappel, Detroit, Col. Grigsby, 1st, \$300; Chas. Smolk, Detroit, Twilight, 2d, \$100; time: 4:17, 4:27½.

Hurdle race—E. Gray, Tecumseh, Morris, \$300; W. Foster, Detroit, Royal George, 2d, \$100; time: 5:3; second horse, 5:15½.

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DIVISION C—SHEEP, SWINE AND POULTRY.

CLASS XIX—SPANISH MERINOES.

Bucks three years old or over—M. W. Bingham, Shoreham, Vt., 1st, \$30; T. A. Beaman, North East, Pa., 2d, \$15.

Bucks two years old—M. W. Bingham, Shoreham, Vt., 2d, \$10.  
 Bucks one year old—P. S. Carlton, St. Clair, Mich., 1st, \$16; J. M. Thompson, Sylvania, Ohio, 2d, \$8.  
 J. W. Langworthy, Lancaster, Pa., pen of 7, 1st, \$16.  
 Five Buck Lambs—J. N. Whittaker & Bro., Lima, Mich., 1st, \$16.  
 Five Ewes, three years old or over—L. J. Thompson, North Adams, Mich., 1st, \$20.  
 Five Ewes, two years old—J. N. Whittaker & Bro., Lima, Mich., 1st, \$16; P. S. Carlton, St. Clair, Mich., 2d, \$8.  
 Five Ewes, one year old—J. N. Whittaker & Bro., Lima, Mich., 1st, \$12.  
 Five Ewe Lambs—J. N. Whittaker & Bro., Lima, Mich., 1st, \$10.  
 John Lark, Jr., improved tourniquet clamp for castrating rams, is worthy of consideration.

L. D. WATKINS,  
 S. G. PATTISON,  
 W. R. SCHUYLER,  
*Committee.*

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CLASS IX—SHEPHERD FINE WOOL.

Bucks one year old—L. J. Thompson, North Adams, Mich., 1st, \$8; L. J. Thompson, North Adams, Mich., 2d, \$4.  
 Five Buck Lambs—L. J. Thompson, North Adams, Mich., 1st, \$8.  
 Five Ewe Lambs—L. J. Thompson, North Adams, Mich., 1st, \$6.  
 There was no competition in the above class.

J. D. ADAMS,  
 N. W. PUGSLEY,  
 G. W. KENNEDY,  
*Committee.*

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CLASS XXI—SOUTH DOWNS.

Bucks three years old or over—Samuel Toms, Oshawa, C. W., 1st, \$15; S. T. Douglass, Grosse Isle, 2d, \$8.  
 Bucks two years old—S. T. Douglass, Grosse Isle, 1st, \$10; S. T. Douglass, Grosse Isle, 2d, \$8.  
 Bucks one year old—Samuel Toms, Oshawa, C. W., 1st, \$8; Samuel Toms, Oshawa, C. W., 2d, \$4.  
 Five Ewes, three years old or over—Samuel Toms, Oshawa, C. W., 1st, \$10; H. C. Willcox, Detroit, 2d, \$5.  
 Five Ewes two years old—Samuel Toms, Oshawa, C. W., 1st, \$8.  
 Five Ewes one year old—Samuel Toms, Oshawa, C. W., 1st, \$8; Samuel Toms, Oshawa, C. W., 2d, \$4.  
 Five Ewe Lambs—H. C. Willcox, Detroit, 1st, \$6.  
 Five Buck Lambs—H. C. Willcox, Detroit, 1st, \$6.  
 The Committee also recommend special premiums to Samuel Toms for one Shropshire buck two years old, and for one Shropshire buck one year old.

M. MILES,  
 JOHN LESSITER,  
 R. DRIGGS,  
*Committee.*

## CLASS XXII—LEICESTERS, COTSWOLDS, AND OTHER LONG-WOOLED SHEEP.

Bucks, three years old or over—George Miller, Markham, C. W., 1st, \$15; William Bishop, Woodstock, C. W., 2d, \$8.

Bucks two years old—George Miller, Markham, 1st, \$10; George Miller, Markham, 2d, \$5.

Five Bucks, one year old—Samuel Toms, Oshawa, 1st, \$8; William Lovering, Woodstock, 2d, \$4.

Five Back Lambs—William Hendrie, Hamilton, C. W., 1st, \$6; Adam Oliver, Aran Bank, C. W., 2d, \$3.

Five Ewes, three years old or over—Samuel Toms, Oshawa, 1st, \$10.

Five Ewes, two years old—George Miller, Markham, 1st, \$8; E. Driggs, Rome Centre, Mich., Cotswolds, 2d, \$4; William Hendrie, Hamilton, Leicesters, 2d, \$4.

Five Ewes, one year old—William Hendrie, Hamilton, 1st, \$8; Samuel Toms, Oshawa, C. W., 2d, \$4.

Five Ewe Lambs—William Lovering, Woodstock, 1st, \$6; William Hendrie, Hamilton, 2d, \$3.

The Committee earnestly recommend that a class of Longwools be made for Michigan sheep, and a separate class for foreign. The experience of the committee shows that as yet our Michigan breeders of coarse woolled sheep cannot fairly be judged by the same standard as foreign competitors, and without a class in which they can exhibit, there will be no opportunity given them to compete, nor will your society do its duty, which is to encourage the introduction of these very meritorious classes into the State.

JOHN LESSITER,  
F. M. MANNING,  
WM. A. HALL,  
*Committee.*

## CLASS XXIII—FAT SHEEP.

Samuel Toms, Oshawa, best pen of five, 1st, \$10; William Bishop, Woodstock, 2d best pen of five, 2d, \$6.

JOHN LESSITER,  
WM. WHITFIELD,  
W. H. ARNOLD,  
*Committee.*

## CLASS XXIV—SWINE.

H. D. Court, Battle Creek, boar of any breed, 1st, \$10.

H. D. Court, Battle Creek, Chester White boar, 1st, \$5; A. B. Taber, Detroit, Chester White boar, 2d, \$4.

A. B. Taber, Detroit, Chester White sow, 1st, \$5; H. D. Court, Battle Creek, Chester White sow, 2d, \$3.

H. D. Court, Battle Creek, Chester White pigs, 1st, \$5.

J. S. Tibbits, Nankin, Essex boar, 1st, \$5.

Wm. Smith, Detroit, Essex sow, 1st, \$5; J. S. Tibbits, Nankin, Essex sow, 2d, \$3.

J. S. Tibbits, Nankin, Essex pigs, 1st, \$5.

Wm. Smith, Detroit, Suffolk sow, 1st, \$5; Wm. Smith, Detroit, Suffolk sow, 2d, \$3.

William Hendrie, Hamilton, Berkshire boar, 1st, \$5.

William Hendrie, Hamilton, Berkshire sow, 1st, \$5.

William Hendrie, Hamilton, Berkshire pigs, 1st, \$5.

J. S. Tibbits, Nankin, Yorkshire boar, 1st, \$5.

William Smith, Detroit, fat hog, 1st, \$5; 2d, \$3.

A. BECKWITH,  
E. C. ROBERTS,  
N. T. SLY,  
*Committee.*

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CLASS XXVI—POULTRY.

E. H. Cressey, Sandwich, game fowls, Kentucky blue, 1st, \$2.

F. E. Eldred, Farmington, gray dorkings, 1st, \$2.

Stephen Smith, Detroit, Sebright bantams, 1st, \$2; white bantams, \$2.

A. B. Taber, Detroit, Brahmas, 1st, \$2; A. S. Drake, Detroit, 2d, \$1.

Edward Parsons, Detroit, Mexican black fowls, 1st, \$2.

A. B. Taber, Detroit, best collection Brahma chickens, recommended an amount equal to first premium.

F. Leslie, Dearborn, three domestic turkeys, 1st, \$2.

F. Leslie, Dearborn, common geese, 1st, \$2.

TALCOTT E. WING,  
WM. GRAY,  
F. A. STOKES,  
*Committee.*

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DIVISION D—FARM IMPLEMENTS.

CLASS XXVII—PLOWING MATCH, FLOWERS, ETC.

Your committee found the number of plows and other articles in this class so numerous that to do justice to the subject would require more time than was allotted to us. We were obliged to divide the committee in order to facilitate the examination, and give every article some little attention, which we have done, and hope we have given reasonable satisfaction to most, if not all the exhibitors. We fear we have come wide of the mark in many instances, but have the satisfaction of knowing that it is the fault of the head and not of the heart. We would most respectfully suggest for the future, that the committee on plows and plowing should be confined to this most important branch, and that no other articles should be put into this class; and further, that good practical men, who can be depended upon to be on hand the first day, should be selected, so that the plows may be tested by actual demonstration, and that a larger premium be offered for plowing, so as to induce more competition.

SWEETSPAKES PLOW PREMIUM, FIFTY DOLLARS.

This premium we did not award, for the reason that, owing to the dryness of the soil, we found it so dry, lumpy and tender that it would not hold together so as to be laid over in any shape, but would fall or crumble to pieces as soon as it was turned up edgewise. The soil was not compact enough to be tried by a scientific test, and we would suggest the propriety of making a trial some other time, when the ground shall be in suitable condition for such purpose. Would also suggest the same thing as to wheat drill, cultivator and roller; also, that the Society purchase a dynamometer, for the purpose of making a scientific trial of the draft of plows. These suggestions are made earnestly, as these articles are the foundation implements for the raising of our bread.

In making our awards we have been guided by real merit, so far as we were able to judge, and hope our awards will all be paid, although many of them are rather discretionary, or not strictly in accordance with the list laid down in the books.

For the plowing match, but two entries were made, viz: George Dodge, of Kalamazoo, and James Green, of Battle Creek.

Mr. Dodge appeared promptly on the ground, with three fine large grey horses and a heavy, handsomely finished plow of his own manufacture, that cut 15 inches wide, and that will do the work handsomely, from six to ten inches deep.

Mr. James Green also appeared just as promptly, with a pair of heavy horses and a fine plow, made by Burnham & Coy, Battle Creek, that cut 11 inches wide in a workmanlike manner, about the same depth.

The ground was very dry and lumpy, so much so that it was impossible to make the work look handsome, but nevertheless it was well done, and we awarded them each a premium of \$5.

We then proceeded to examine other plows and found the number so extra numerous that we were obliged to divide them into classes in order to give any kind of satisfaction, in awarding the premiums to the many different kinds that were, in our opinion, really entitled to premiums. We agreed to the following, viz:

Geo. Dodge, Battle Creek, best green sward plow, 1st premium, dip. and \$5; Chas. Gale & Co., Albion, second best green sward plow, 2d, \$3.

Detroit Agricultural Works, Detroit, best steel plow, made by G. Lord Waterman, N. Y., 1st, dip. and \$5; W. S. Penfield, Detroit, 2d best steel plow, 2d, \$3.

Mosley, Bahm & Co., Pittsburg, Penn., one triumph plow, special dip. and \$5.

W. S. Penfield, Detroit, best plow for general use, 1st, \$5; F. C. Goff, Cleveland, Ohio, 2d, \$3.

Detroit Agricultural Works, Detroit, best assortment of plows, very fine, 1st, \$5; W. S. Penfield, Detroit, second best assortment of plows, 2d, \$3.

Burnum & Coy, Battle Creek, six improved Scotch plows, all good, 1st, \$5.

Joseph Frey, Battle Creek, 2d, \$3.

F. M. Mattice, Detroit, best ditching plow, 2d, \$3.

George Dodge, Kalamazoo, best gang plow, 1st, dip. and \$5; Burnham & Coy, Battle Creek, 2d, dip.

F. C. Goff, Cleveland best one-horse plow, 1st, \$3.

C. P. Devereaux, North Newberry, plow with cleaner, 2d, \$3.

A. G. Bruce, Almont, best two horse wheel cultivator, 1st, \$3; J. F. Bryan & Bro., Detroit, 2d, recommended.

M. A. Spink, Detroit, self-cleaning plow coulter, \$3.

Detroit Agricultural Works, Detroit, one sod cultivator, 1st, highly recommended.

E. H. Knight & Marshall, Unadilla, N. Y., two horse cultivator, a good kind, 1st, highly recommended; George Dodge, Kalamazoo, 2d, recommended.

Peter Low, Cherry Valley, N. Y., combined broadcast seeder and cultivator, 1st, highly recommended.

Martin Hayden, Detroit, seeder and cultivator combined, 1st, highly recommended.

Hyde & Howland, Kalamazoo, one horse cultivator, double and single share plow combined, 1st, highly recommended.

Detroit Agricultural Works, Detroit, one horse cultivator with thills, 2d, recommended.

John Adams & Co., Marshall, Calhoun Co., Cook's patent plaster and seed sower, 1st, \$3; A. Bugbee, Elkhart, Ind., 2d, recommended.

F. D. Beckwith, Dowagiac, two horse drill for sowing grain crops, 2d, recommended.

Liddell Bros., Onondaga N. Y., best corn or bean planter, horse power, 1st, dip. and \$5; S. E. Keifer, Grand Rapids, 2d, recommended.

W. S. Penfield, Detroit, set draining and ditching tools, 1st, \$1.

Arthur Burtis, Detroit, circular rotary harrow, 1st, dip. and \$3.  
 James Palmer, iron harrow, 2d, recommended.  
 Hoosier & Co., Milton, Wayne Co., Ind., seed drill—out of State, 2d, recommended.  
 J. Frey, Battle Creek, plow wheel, 1st, \$1.  
 H. H. Bonine, St. Joseph, combined seeder and sower, in State, highly recommended.  
 Chas. Gale & Co., Albion, cultivator of ground and substitute for plow, 1st, highly recommended.

Hyde & Howland, Kalamazoo, one horse cultivator, double and single shovel plow combined, 1st, highly recommended.

J. A. Caldwell, Dexter, hand machine for sowing plaster or artificial manure, 1st, \$1.

Mechanics' and Inventors' Association, Detroit, hand corn planter, 1st, \$1.

Thomas & Mast, Springfield, Ohio, one horse grain drill, 1st, highly recommended.

R. N. Moore, Ypsilanti, wheat drill, made in State, 1st, highly recommended.

Dr. Rose & Cogswell, Detroit, one-half dozen adjustable hoes, very fine, 1st, \$2.

Joseph Doan, Richmond, Ind., ditching machine, a good ditcher, 1st, dip. and \$5.

James Cocco, Holmesville, Ohio, portable planter, 2d, recommended.

Henry Farmer, Pontiac, potato digger, 1st, highly recommended.

Standart Bros., Detroit, one scuffle hoe, a nice thing, \$4.

F. D. Beckwith, Dowagiac, Cass Co., exhibited one two-horse drill, for sowing grain crops; grass and clover sower for horse power; two-horse drills for sowing grain crops; all expensive and good articles, and really entitled to special premiums—say diploma and cash at least \$5.

The Jackson Agricultural Works, of Jackson, entered the following list of articles: One dozen steel socket hoes; one dozen No. 4 ladies' hoes; one-half dozen castor planters hoes; one No. 1 castor four teeth Ward hoe and raker; one-half dozen spading forks, strapped ferule, all very fine goods.

These are all the articles found on my list—every one of them of superior quality and useful, and should have premiums.

E. S. HILL, Monroe City,  
*Chairman Committee.*

#### CLASS XXVIII.

General Agent for D. M. Osborne & Co., Milwaukee, Wis., reaper without self-raking attachment, 1st, medal.

R. H. Gammon, Detroit, reaper with self-raking attachment, 1st, medal.

Younglove, Massey & Co., Cleveland, Ohio, mowing machine, 1st, medal.

W. C. Dennison, Grand Rapids, combined mower and reaper, 1st, medal.

W. R. Waldron, Webster, hay unloader, dip.

D. S. Morgan, Brookport, N. Y., self-raking attachment applicable to other machines, 1st, medal.

J. R. Caldwell, Dexter, horse pitchfork, 2d, dip.

Loomis & Wagner, Adrian, horse pitchfork, 1st, medal.

General Agent for D. M. Osborne & Co., Milwaukee, hand and self-raking reaper and mower, recommended silver medal.

Jackson Agricultural Works, Jackson, one-half dozen corn cutters, 1st, \$1.

Jackson Agricultural Works, Jackson, one and one-half dozen scythe snaths, \$3.

Fennell, Bortree & Co., Ypsilanti, excelsior sulky horse rake, 1st, \$3.

H. L. Hill, Pontiac, hand corn husker, 1st, dip.

Rice, Briggs & Co., Detroit, husker and stalk cutter combined, 1st, \$2.

*To the President and Executive Committee of the Michigan State Agr. Society, Detroit:*

GENTS:—We, the undersigned, being committee, beg leave to make the following report: We have made a thorough examination of reapers and mowers, also other implements in Class 28, or the best reapers with self-raking attachments. The Marsh Harvester has decided merits over all others; best hand rake reaper, Kirby's best combined reaper and mower. In mowing machines we have a large competition, all of which have decided merits, and the committee felt almost unable to decide, yet they united unanimously in a slight preference for the light Hubbard mower.

After a trial of potato diggers on the ground, we find, under perhaps unfavorable circumstances, that it was not sufficiently satisfactory to warrant us in awarding a premium; still after the machines have become perfected we think they may become useful, especially the one exhibited by Baldwin & Way, of Pontiac.

We noticed an assortment of forks and snaths entered in our class without any premium being awarded; we recommend a discretionary premium of \$2.

W. O. HANFORD,  
G. H. FELT,  
*Committee.*

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CLASS XXIX.

- J. F. Bryan & Bro., Detroit, threshing machine, horse power, or separator, 1st, \$8.  
J. F. Bryan & Bro., Detroit, corn sheller horse power, 1st, dip. and \$3.  
J. F. Bryan & Bro., Detroit, portable cider mill, 1st, \$3.  
H. F. Bailey, Albany, N. Y., champion thrasher, dip.  
Jackson Agricultural Works, Jackson, hand corn sheller, 1st, dip. and \$3.  
J. C. Birdsell, South Bend, St. Joseph Co., clover seed thrasher, huller and sheller, 1st, dip. and \$5.  
Wayne & Robinson, Detroit, portable steam engine, 1st, dip. and \$10.  
Wayne & Robinson, Detroit, portable double circular saw-mill, 1st, silver medal.  
Wayne & Robinson, Detroit, one set works for circular saw-mill, 1st, silver medal.  
White & Bostwick, Norwalk, Huron county, O., one horse power for general use, 1st, dip. and \$4.  
W. Hanson, Willoughby, Ohio, refining and evaporating range, 1st, medal and \$10.  
G. H. Felt, Brooklyn, Jackson county, hay, straw and stalk cutter, horse-power, 1st, dip. and \$5.  
K. C. Barker, Detroit, Blake's patented endless, changeable plank horse-power, 1st, silver medal.  
T. A. Flower, Pontiac, farmer's vegetable cutter, 1st, \$3.  
G. E. Hutchinson, Cleveland, hay, straw and stalk cutter, 1st, dip. and \$5.  
J. Pappineau, Dayton, Ohio, sugar-dryer, 1st, dip.

E. W. SIMMONS,  
C. P. SPRAGUE,  
J. M. FAREN,  
*Committee.*

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CLASS XXX.

- F. Reuhle, Detroit, best and greatest variety of carriages, buggies, etc., 1st, \$20, dip.  
Austin Thomas, Jackson, best double farm wagon, 1st, \$10.  
H. Johnson, Detroit, best spring wagon, 1st, \$10.  
John Patton, Detroit, two-horse family carriage, 1st, \$10.

F. Beuhle, one-horse family carriage, 1st, silver medal.

Charles Parsons, Pontiac, one top buggy, 1st, \$10.

F. Beuhle, Detroit, buggy without top, 1st, \$10.

H. Johnson, Detroit, trotting wagon, 1st, \$10.

A. C. Flak, Coldwater, trotting sulky, 1st, \$6.

James Palmer, Northville, Wayne county, farm wagon for all purposes, 1st, \$10.

A. D. Power, Farmington, spring wagon for market, 1st, \$10.

John Patton, Detroit, single sleigh or cutter, 1st, \$10.

J. F. Bryan & Bro., Detroit, best lot sleighs for lumbering, 1st, \$8.

Only one two-horse family sleigh on exhibition, and that was not considered worthy of a premium by your committee.

Mr. Chas. Parsons, of Pontiac, exhibits a patent spring buggy seat that appears to be very easy to sit upon. Messrs Kretch & Crane, of Cleveland, exhibit some specimens of axles of their manufacture, that appear to be a superior article. Mr. O. C. Comstock, of Grand Rapids, exhibits a lumber rack, patented by him, which is certainly a very good labor-saving machine. We are sure that one man can load and unload more lumber on this wagon than two could on a common wagon. We would recommend that Mr. Comstock be awarded a special premium, and would say to the lumbermen that they would save money by the use of this wagon.

L. E. SCRANTON,  
HENRY CASTLE,  
GEORGE BLOOMBERG,  
*Committee.*

#### CLASS XXXI—BARNYARD ARTICLES.

George Dodge, Kalamazoo, 1st, six clevises, \$1.

Fairbanks, Greenleaf & Co., Chicago, one pair cattle scales, dip. and \$5.

Joseph King, Bay City, one hand wood-saw, 1st, dip. and \$3.

Shaw & Houghton, Detroit, collection axes, hoes, chisels and carpenter's tools, 1st, dip. and \$3.

Jackson Agricultural Works, sample manure forks, \$3.

W. A. Munson, Wayne, one road scraper, 1st, \$1.

H. A. Dennison, Troy, one farm gate, 1st, \$1.

J. F. Bryan & Bro., Detroit, set of grain measures, 1st, \$1.

J. Bryan, Detroit, tallying machine, bag-holder and and header, 1st, \$1.

Burnham & Coy, Battle Creek, horse-power wood-sawing machine, 1st, \$5.

C. M. Bowen, Vineland, N. J., stump and grub extractor, 1st, \$5 and silver medal.

White & Bostwick, Norwalk, Ohio, combined cross-cut and circular sawing machine, 1st, dip. and \$5.

White & Bostwick, Norwalk, Ohio, combined circular saw driven by horse-power, 1st, dip. and \$5.

White & Bostwick, Norwalk, Ohio, cross-cut sawing machines, adapted to horse-power, 1st, \$3.

H. M. Smith, Kalamazoo, box 92, one hay knife, discretionary premium, \$1.

N. Mooney, Birmingham, three set horse shoes, discretionary premium, \$1.

D. C. Smith, Adrian, one fruit ladder, discretionary premium, \$1.

A. D. Stooking, Dowagiac, one fruit ladder, discretionary premium, \$1.

White & Bostwick, Norwalk, O., boring and rip sawing machine, discretionary prem., \$1.

D. B. Taylor, Avon, fruit ladder, second, discretionary premium, 50 cents.

Fayette Clarke, Marcellus, N. Y., grain handler, second, discretionary premium, 50 cts

Hudson Milford, farm gate, second, discretionary premium, 50 cts.



James T. Fyfe, Plymouth, Ind., stump and grub extractor, second, discretionary prem., \$1.  
 E. Simonds, Northville, Mo., one tyre upsetting machine, discretionary premium, \$1.  
 E. M. Boynton, Grand Rapids, one cross-cut saw and drag machine, discretionary prem.  
 J. D. Mathews, Springport, portable saw, discretionary premium, \$1.  
 Baraham & Coy, Battle Creek, one straw guide, discretionary premium, \$1.  
 Burnham & Coy, Battle Creek, feed for saw machine, discretionary premium, \$1.  
 Emery Sadler, Monroe, one farm gate, discretionary premium, \$1.  
 E. E. Tift, Angola, N. Y., fruit gatherer, discretionary premium, \$1.  
 G. W. Carpenter, Northville, pair sheep shears, discretionary premium, 50 cts.

E. R. WILLIAMS,  
 TRUMAN LITTLE,  
 D. W. GREEN,  
*Committee.*

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CLASS XXXII.

R. C. Browning, New York city, one washing machine, 1st, \$2.  
 C. M. Booth, Detroit, one clothes dryer, 1st, \$1.  
 Coffar & Co., Detroit, four dozen brooms, 1st, \$1.  
 Fairbanks, Greenleaf & Co., Chicago, scales Dormant, 1st, dip.  
 E. C. Kellogg, Rome, N. Y., stock or cattle force pump, 1st, dip.  
 W. B. Penfield, Detroit, spinning wheel, 1st, \$1.  
 H. E. Southworth, Detroit, Mason's fruit jars, 1st, dip.  
 J. M. Cook, Tiffin, Ohio, six mops and handles, 1st, \$1.  
 J. M. Cook, Tiffin, Ohio, assortment of woodenware, 1st, dip.  
 N. B. Rowley & Son, Detroit, dairy scales, 1st, \$2.  
 N. B. Rowley & Son, Detroit, 3,500 lb Dormant scales, 1st, dip.  
 Michigan Churn Manufacturing Company, Parma, Wescott's patent adjusting dash churn, 1st, dip.

J. W. Myers, Cleveland, Ohio, bread cutter, discretionary, recommended.  
 J. H. Cogshall, Lexington, nursing couch, discretionary, recommended.  
 J. W. Cook, Tiffin, Ohio, fruit dryer, discretionary, recommended.  
 John Zimmerman, New York, novel coffee steam extractor, discretionary, recommended.  
 R. C. Browning, New York, universal clothes wringer, discretionary, recommended.  
 Fairbanks, Greenleaf & Co., Detroit, best assortment scales, discretionary, dip. and \$2.  
 J. S. Martin, Detroit, two dish washing machines, discretionary, dip.  
 H. C. Burtman, Monroe, churn and dasher, discretionary, recommended.  
 G. H. & W. W. Smith, Strongsville, Ohio, washing machine, discretionary, recommended.

C. IVES,  
 MRS. C. IVES,  
 MRS. E. J. WILBY,  
*Committee.*

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CLASS XXXIII—STOVES AND HOLLOW-WARE.

Edwin Jerome, Detroit, No. 13 Oriental heating stove, 1st, \$10.  
 Standart Bros., Detroit, one Stewart's cook stove and furniture, 1st, silver medal.  
 Standart Bros., Detroit, one sheet iron parlor elevated oven cook stove, 1st, \$7.  
 C. M. Young & Co., Detroit, petroleum parlor and chamber stove, dip. and \$5.  
 C. M. Young & Co., Detroit, petroleum cooking stove, 1st, dip. and \$5.  
 Detroit Stove Works, W. J. H. Telf & Co., Detroit, 15 hotel cookstoves, 1st, \$10.

Sales & Pelgram, Detroit, one cook stove, "hollow-ware," 1st, \$3.  
 Sales & Pelgram, Detroit, best assortment of parlor coal and wood stoves, 1st, dip.  
 Sales & Pelgram, Detroit, parlor stove, self-regulator, 1st, \$5.  
 Standart Bros., Detroit, coal cooking stove, 1st, \$5.  
 C. D. Strubel, Detroit, one parlor and hall stove for wood, 1st, \$7.  
 Standart Bros., Detroit, four soap-stone stoves, 1st, dip.

The Committee on Manufactures, having examined the very large assortment of cooking and heating stoves, manufactured by the Detroit Stove Company, of this city, adapted for the burning of both coal and wood, think they compare favorably in style and finish with any stoves in the eastern market, and made of very superior iron, and feel proud that such a manufacturing establishment is located in the State, which is destined very largely to supply the wants of the State.

The committee wish to call especial attention to the cooking and heating stove manufactured by Charles Eddy & Co., of Troy, N. Y., and exhibited by Messrs. Standart & Bro., of this city, adapted for the burning of soft bituminous coal, believing them to be of special merit, and possessing great advantages for burning soft coal, the fuel of the west, think they deserve special mention as a step in advance of the common mode of burning bituminous coals.

S. W. WALKER,  
 W. H. STODDARD,  
 W. S. GUNN,  
 OLIVE NICHOLS,  
*Committee.*

#### DIVISION E—FIELD AND GARDEN PRODUCTS.

##### CLASS XXXIV—FIELD AND GARDEN PRODUCTS.

Samuel Rappleye, Ridgeway, Mich., one bushel new variety winter wheat, 1st, \$3; one bushel winter red wheat, 1st, \$3; one bushel new oats, 1st, \$2; one bushel new oats, 2d, \$1; one bushel timothy seed, 1st, \$2; one bushel buckwheat, 1st, \$2.

John Gilbert, Ovid, Mich., one bushel winter red wheat, 2d, \$2; one bushel white wheat, 2d, \$2; one bushel four rowed barley, 1st, \$3; one bushel white beans, 1st, \$2; one bushel small clover seed, 1st, \$2; one sample flour from Michigan white wheat, 2d, \$2; one sample flour from Michigan red wheat, 1st, \$2; assortment of heads of wheat, 1st, \$5 and dip.; assortment of heads of oats, 1st, \$5 and dip.; display of collections of the several kinds of grain in head, 1st, \$10.

N. T. Bradner, Redford, one sample hops, 1st, \$2.

Harvey Haynes, Coldwater, one sample hops, 2d, \$2.

J. B. Bliss, Detroit, two bushels Diehl winter wheat, 1st, \$2.

Samuel Fenno, Coldwater, one bushel white rye, 1st, \$2.

Jason Hemeway, Deerfield, one bbl. white wheat flour, 1st, \$3 and dip.

N. T. Bradner, Redford, one hop-pole with hops, 2d, \$2.

CHAS. BALDWIN,  
 GEO. BROWNELL,  
 JAMES PIERCE,  
*Committee.*

##### CLASS XXXV—VEGETABLES.

Samuel Rappleye, Ridgeway, variety of roots for cattle, 2d, \$2.  
 T. A. Parker, basket apple tomatoes, 1st, \$2.

- T. A. Parker, Detroit, 12 roots salsify, 1st, \$1.  
 T. A. Parker, Detroit, 12 roots parsnips, 1st, \$1.  
 D. S. Osborn, Detroit, one-half dozen rhubarb, 1st, \$1.  
 J. R. Caldwell, Dexter, one peck early Shaw potatoes, 2d, \$1.  
 J. R. Caldwell, Dexter, one peck white sweet turnips, 1st, \$1.  
 Joseph Bridge, Detroit, one peck sweet potatoes, 1st, \$1; three crookneck squashes 1st, \$1.  
 Thomas Smith, Hamtramck, six Turban squashes, 1st, \$1; six Hubbard squashes, 1st, \$1.  
 William Perry, Redford, 1 peck table potatoes, peach blow, 1st, \$2.  
 John Ford, Detroit, 12 blood beets, 1st, \$1; six vegetable eggs, 1st, \$1.  
 Mr. J. A. Berry, of Detroit, exhibited several specimens of superior quality of super-phosphate of lime; also, fine ground bone, to which the committee recommend a diploma.

E. D. LAY  
 JOHN M'EWAN,  
 WM. ADAIR,  
*Committee.*

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DIVISION F.

CLASS XXXVI.

- Mrs. S. F. Lerich, Utica, 15 lbs. butter made in June, 1st, \$5; 25 lbs. butter made any time, 2d, \$5.  
 Rufus Baker, Fairfield, Lenawee county, best cheese, 50 lbs. or over, 1st, \$10; best cheese 50 lbs. or over, 2d, \$5; one cheese less than 50 lbs., 1st, \$5.  
 A. B. Smith, Farmington, Oakland, best display factory cheese, 1st, silver medal; one cheese over 50 lbs. 2d, \$3.

MRS. C. W. GREENE,  
 JOHN THOMAS,  
 SAMUEL HORTON,  
 MRS. L. POOLER,  
 MRS. J. THOMAS,  
*Committee.*

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CLASS XXXVII.

- J. H. Thomas, Brooklyn, Ontario, 1 bee hive, 1st, \$5.  
 John Gilbert, Ovid, 1 box honey, discretionary premium, \$1.  
 A. D. Power, Farmington, 10 lbs. maple sugar, 1st, \$2; 1 gallon syrup from sorghum, 1st, \$4.  
 J. T. Weeks, Napoleon, 5 lbs. sorghum sugar, 1st, \$5; display of sorghum sugar, 1st, \$5.  
 T. J. Haywood & Co., Detroit, 1 box extra choice honey, 1st, \$2.  
 W. A. Flanders, Shelby, Richland county, O., bee hive and method of securing honey and caring for bees, diploma.  
 K. P. Kidder, Burlington, Chittenden County, Vt., 1 double bee hive, diploma.

E. ROOD,  
 A. F. MOON,  
 W. CAMPBELL,  
 H. S. TYLER,  
 L. D. BERRY,  
*Committee.*

## CLASS XXXVIII

Walter N. Silk, Detroit, four cans and twelve bottles pickled vegetables, 1st, \$5; three loaves bakers' bread, 1st, diploma; three loaves yeast bread (French twist), 1st, \$3; sample of corn bread, 1st, \$2.

K. M. Lemon, Detroit, sample of self-rising flour, diploma.

Mrs. E. Perkins, Birmingham, three loaves salt rising bread, \$4; two loaves corn bread, 2d, \$1.

Miss Flora Hooper, Breedsville, specimen canned peaches and pears, 1st, \$3; specimen of canned plums, cherries and crab apples, 1st, \$3.

(Signed)

E. BUELL,  
*Chairman.*

## CLASS XXXIX—WINES, VINEGARS AND CORDIALS.

J. O. Melick, Detroit, specimens of grape wine, Concord and mixed, 1st, \$2.

Samuel Fenno, Detroit, half-gallon rhubarb wine, 1st, \$2.

Smith, Dickinson & Co., Detroit, one barrel pure elder vinegar, 1st dip. and \$2.

Mrs. Merritt Chase, Royal Oak, one gallon pure elder vinegar, home-made, 1st, \$2; specimen canned fruit, 2d, \$1.

M. Lansbergh, Detroit, one keg elder vinegar, 2d, \$1; one keg white vinegar, 1st, diploma.

Smith, Dickinson & Co., Detroit, one barrel malt vinegar, 1st, diploma.

Henry Miller, Detroit, one half-barrel lager beer, 1st, recommended.

Lanergan & Mack, Detroit, exhibition of foreign cordials, 1st, dip. and \$5.

S. Griggs, Detroit, bitters and preparation for the hair and teeth, 1st, recommended.

W. E. Bartholomew, Detroit, hair oil and perfumery, 2d, recommended.

Lanergan & Mack, Detroit, collection of fine groceries, 1st, dip.; collection of pickled vegetables, 1st, dip.

J. M. Sealey, Detroit, perfumery extracts, hair oil and pomades, 1st, dip.

Walter N. Silk, Detroit, collection pickled vegetables, domestic, 1st, \$1.

Phelps & Co., Detroit, specimen cans and canned fruit, dip.

Watkins & Turner, Detroit, specimens fancy pop corn, 1st, dip.

J. L. Mathews, Detroit, specimen 500 cigars, "J. L. M.," 1st, dip.

Atzer & Kruger, Detroit, cigars, 2d, \$1.

Thos. K. Boggs, Detroit, collection of fine plug tobacco, 1st, dip. and \$1.

Hanna & Co., Detroit, samples fine cut tobacco, 1st, dip.

G. B. Lichtenburg, Detroit, samples fine cut tobacco, 2d, \$1; samples smoking tobacco, 1st, dip.

J. Rosenfield & Bros., Detroit, fine cut chewing tobacco, dip.

Special attention is called to a fine collection of bottled ale and porter exhibited by Messrs. Lanergan & Mack, of Detroit

E. N. WILCOX,  
W. G. BECKWITH,  
WARNER WING,  
W. H. CLEVELAND,  
*Committee.*

## DIVISION G.

## CLASS XI.

F. Leslie, Dearborn, woolen blankets, 1st, \$4; ten yards flannel, 1st, \$4; pair woolen stockings, 1st, \$2; pair woolen mittens, 1st, \$2.

A. C. Smith, Farmington, woolen blankets, 2d, \$2.

Abigail Brink, Perrinsville, Wayne Co., ten yards woolen cloth, 1st, \$4.

A. B. Smith, Farmington, ten yards flannel, 2d, \$2.

Mrs. C. Terry, Pontiac, ten yards rag carpet, 1st, \$3; ten yards rag carpet, 2d, \$2.

Mrs. Abigail Brink, Perrinsville, ten yards coverlet, 1st, \$2; pair woolen stockings, 2d, \$1; pair woolen mittens, 2d, \$1; two pounds stocking yarn, 1st, \$2; one pair flannel sheets, \$2; one woolen scarf, \$2.

Caroline Quimby, Detroit, bed spread, 1st, \$3.

N. Bour, Grosse Point, bed spread, 2d, \$2.

Miss Amanda Nye, Romeo, patch-work quilt, 1st, \$2.

Miss Lizzie Long, Detroit, patch-work quilt, 2d, \$2.

Mrs. C. Terry, Pontiac, log cabin quilt, dip.

A. B. Smith, Farmington, ten yards table linen, \$3; ten yards linen cloth, \$2; pair linen sheets, \$1; pair white linen table cloths, \$1; two pair linen stockings, \$1; one pair cotton stockings, \$1.

D. S. PRIEST,  
MRS. WM. A. WELLS,  
MRS. J. M. STERLING,  
*Committee.*

## CLASS XII.

James Nall, Jr., & Co., Detroit, general display of carpets, 1st, dip.; hearth-rugs, 1st, dip.; fancy door mats, 1st, dip.

T. F. Abbott, Detroit, pair tamboured lace curtains, dip.; general display of curtains, 1st, dip.; display of window blinds, 1st, dip.; display of oil cloths, 1st, dip.

H. R. Gardner & Co., Jonesville, display of woolen goods, 1st, dip. and \$3.

Col. Mark Flanigan, Detroit, display of cotton goods, 1st, dip. and \$5.

Wile, Fox & Co., Laporte, Ind., display of flannel goods, 1st, dip.; display of woolen goods, 1st, dip.

S. O. KNAPP,  
WM. CORBIN,  
S. FOLSOM,  
*Committee.*

## CLASS XIII.

Hugo Hill, Detroit, three articles of millinery, 1st, dip. and \$5.

Bottomley & Loud, Romeo, five hoop skirts, dip.

Bostwick & Co., Detroit, specimen of laundry work, dip.

David Carver, Detroit, one suit men's clothes, 1st, \$3.

MRS. E. C. BARKER,  
MRS. E. N. FIELDS,  
MISS HATTIE LINCOLN,  
MR. C. H. LINCOLN,  
*Committee.*

## CLASS XLIII.

H. D. Edwards, Detroit, best assortment of India rubber goods, 1st, \$3; oak tanned and rubber belting, dip.

A. R. Morgan, Detroit, best ladies' summer walking shoes, 1st, \$1; one pair ladies' winter shoes, 1st, \$1; gents' slippers, 1st, \$1; ladies' slippers, 1st, \$1; gents' winter boots, 1st, \$1; gents' summer boots, 1st, \$1.

H. P. Baldwin, Detroit, best cow hide boots, 1st, \$1; men's boot toes, dip.

Pengra & Smith, Detroit, ladies' summer walking shoes, 2d, dip.; ladies' winter shoes, 2d, dip.

W. A. Throop & Co., Detroit, best book binding, dis.

Henry Brunner, Cleveland, two fancy buffalo robes, dis. dip.

Bidleman & Co., Toledo, best ladies' traveling trunk, 1st, \$3; best ladies' satchel, 1st, \$1.

Drouillard & McCully, Detroit, one single wagon harness, 1st, \$3; double carriage harness, 1st, \$5; single or buggy harness, 1st, \$3.

Jackson Collar Co., Jackson, lot horse collars, 2d, dip.

James Davis, Detroit, half dozen horse collars, 1st, \$1.

Algeo & Willson, Kalamazoo, tongueless trace buckle, dip.

James S. Havens, Detroit, one pair patent rubber heels, dip.

Watkins & Wolf, Detroit, lot of trunks and valises, 2d, \$3.

H. B. GARDNER,

A. H. WIGGINS,

*Committee.*

## CLASS XLIV—DOMESTIC MANUFACTURES—ARTICLES OF FURNITURE MANUFACTURED IN MICHIGAN.

Wm. Brown & Bro., Detroit, lounge or couch, 1st, dip. and \$3.

J. D. Pratt & Co., Cleveland, Ohio, bed lounge, dip.

Detroit Chair Factory, Detroit, best display of cane chairs, 1st, dip. and \$3.

J. M. Stephens, best Venetian blind and shade, dip.

Geo. Smith & Co., Detroit, billiard table, dis. dip.

Detroit House of Correction, Detroit, some common chairs, 2d, dip.

Van Downer & Kiser, Detroit, combined wardrobe, 1st, dip.

Clements & Ruth, Little Prairie Ronde, maple, oak, and walnut veneers, dis. dip.

E. K. Hatfield, Oshkemo, desk and counter chair, dis. dip.

D. Clarkson, Northville, folding seat and desk, dis. dip.; combination seat and desk, dis. dip.; iron frame seat and desk, dis. dip.

E. W. Tucker, Lowell, Union spiral and elliptic spring bed, 1st, dip.

A. Dundero, Detroit, willow chair and table, dis., dip.

Henry Webber, Detroit, side-board, 1st, dip.; book-case, 1st, dip. and \$5; parlor suit, 1st, dip. and \$10; center-table, 1st, \$3; bedstead, 1st, dip.

J. W. Myers, Detroit, spring bed, received for special premium.

P. M. BENTLEY,

WM. HOUSE,

*Committee.*

## CLASS XLV—DOMESTIC MANUFACTURES—ORNAMENTAL IRON WORK.

G. D. Struble, Detroit, best iron vase on pedestal, 1st, \$1; iron settee, 1st, dis.; iron chair, 1st, \$1; fruit and vase stand, 1st, \$1; display of rustic urn, 1st, \$2.

H. W. STANDART, Jr.,

EDWIN JEROME, Jr.,

*Committee.*

## DIVISION H—FINE ARTS, NEEDLE-WORK, ETC.

## CLASS XLVI—PAINTINGS, PHOTOGRAPHS, STATUARY, ETC.

Dean, Brow & Co., Detroit, best collection of paintings shown by a resident of Michigan, 1st, silver medal, \$5; best collection of paintings shown by a resident of Michigan 2d, \$5; painting in oil by Michigan artist, "Last of the Race," by J. M. Stanley, 1st, \$3; painting in oil by Michigan artist, 2d, \$3; original water color drawing, 1st, \$3; original water color drawing, 2d, \$1.

Cadwallader Bros., Detroit, best collection of photographs, 1st, dip. and \$5; best photograph portrait, India ink, \$3.

H. L. Bingham, Kalamazoo, second collection ambrotypes and photographs, 2d, dip. and \$3; second best photograph, \$2.

Dean, Brow & Co., Detroit, best collection of statuary, from the gallery of H. P. Baldwin, 1st, dip. and \$5.

John W. Combs, Detroit, second best collection statuary, \$3.

Miss Leonora Collar, Detroit, best pencil drawings, 1st, \$1.

C. D. Wildman & Brenner, Detroit, fine show of mouldings for picture frames, 1st, worthy.

Wm. Wright & Co., Detroit, specimens of mirrors, very fine, regarded as best.

Adam Elder, Detroit, double mirrors, fine.

Dean, Brow & Co., Detroit, two pier glasses and tables, a fine display, not especially worthy of note.

Mrs. F. E. McGarry, Detroit, colored photograph, 2d, good.

Cadwallader Bros., Detroit, photograph portrait in oil colors, very fine, best; photograph portrait in oil colors, very fine, best.

L. Black & Co., Detroit, set of oil cromos, "The Seasons," very good.

James A. Foster, Detroit, artificial limbs, very good, recommend a small premium and diploma.

Wm. Wright & Co., Detroit, best graining and marbling, 1st, \$5; best sign painting, 1st, diploma.

Wm. Reiner, Detroit, a lot of stencil plates and dies, a perfect set and quite complete.

J. H. Goldsmith, Detroit, ornamental penmanship, 1st, diploma.

Board of Trade Business College, Detroit, business penmanship, 1st, dip.

O. D. Case & Co., Detroit, best specimen of book-binding, 1st, recommended.

James Anderson, Architect, Detroit, drawing of City Hall, 1st, diploma.

Cadwallader Bros., Detroit, best photograph of State Fair Grounds, 1st, dip. and \$3; second best photograph of State Fair Grounds, \$1; best photograph of annual show, 1st, \$3.

The committee upon the foregoing list, Division A, Class 46, found but few articles worthy of notice beyond the list upon which premiums or diplomas are offered by the Society. Notations stating the views and opinions of the committee upon the various articles not enumerated in the premium list, will be found opposite the entry of each article. In frescoes, no drawing was exhibited except by Messrs. Wm. Wright & Co., who refer the Society to specimens of their frescoing at the Biddle House, and at M. S. Smith & Co's. Messrs. Dean, Brow & Co., refer for specimens of their frescoing to the Russell House dining room. The committee recommend that the Society appoint a committee to examine the frescoing referred to, as your committee could not, of course comply with the request of the exhibitors. In artificial limbs, the committee recommend a premium and diploma, as the limbs exhibited perfection in their way

E. O. GROSVENOR,  
MRS. W. S. WILLCOX,  
MRS. W. J. BAXTER,  
*Committee.*

## CLASS XLVII—MUSICAL INSTRUMENTS.

The committee on Class 47 would respectfully report as follows:

J. H. Whittemore, Detroit, best grand piano for concert use, "Schonacker," 1st, \$10 and silver medal.

Adam Couse, Detroit, best parlor grand piano, Lindeman Cycloid, 1st, \$10 and silver medal.

J. H. Whittemore, Detroit, best square piano, concert scale, "Schonacker," 1st, \$10 and silver medal.

R. D. Bullock, Jackson, best organ for church use, S. D. & H. J. Smith's American reed organ, 1st, \$10 and diploma.

R. D. Bullock, Jackson, best organ for parlor use, S. D. & H. J. Smith's American reed organ, 1st, \$10 and diploma.

C. J. Whitney & Co., Detroit, best melodeon of any make, 6-octave, double reed, 1st, \$5 and diploma.

Ling & Chandler, Detroit, best melodeon of Michigan manufacture, 1st, \$5 and diploma.

J. H. Whittemore, Detroit, best assortment of instruments for orchestra, 1st, \$5 and diploma.

Your committee would further recommend an award of discretionary second premiums, as follows:

C. J. Whitney & Co., Detroit, second best square piano, "Marshall & Mattauer," 2d.

James E. Drake, Detroit, second best organ for church use, portable pipe organ, 2d.

J. H. Whittemore, Detroit, second best parlor organ, Burdett organ, 2d.

Ling & Chandler, Detroit, second best melodeon, any make, 2d.

C. J. Whitney & Co., Detroit, second best melodeon, Michigan manufacture, 2d.

LYSANDER WOODWARD,

F. S. CLARK,

MRS. D. M. BAKER,

*Committee.*

## CLASS XLVIII—SEWING MACHINES.

Your committee find the following machines entered for exhibition only:

S. E. Randall, Detroit, Grover & Baker machines, a fine display.

West & Comly, Detroit, Wheeler & Willson's machines, a fine display.

A. H. West & Co., Detroit, Howe sewing machines, a fine display.

W. E. Cooper, Detroit, Singer sewing machines, a fine display.

Willcox & Gibbs, Chicago, Willcox & Gibbs' machines, a fine display.

Weed S. M. Co., Hartford, Conn., Weed sewing machine, a fine display.

E. W. Gleason, Detroit, Florence machine, a fine display.

The only machines entered for competition as family machines are Nos. 54 and 59. Taking into consideration quality of work, together with price of machine and facility for working, your committee award as follows:

D. B. Herrington, Detroit, Star shuttle sewing machine, 1st.

J. V. D. Eldridge, Detroit, Domestic sewing machine, 2d.

But one entry is made for competition for manufacturing purposes which your committee award the prize:

J. V. D. Eldridge, Detroit, Domestic sewing machine for manufacturing purposes, 1st.

A binding and tucking attachment adapted to use with any machine, invented by Rev. W. J. Chaplin, P. H. Beckwith, Dowagiac, is highly commended by your committee, and they would recommend that a discretionary first premium be awarded.



E. W. Gleason, Detroit, knitting machine, 1st.

M. L. Roberts, Philadelphia, Great American glove and stocking knitting machine, 2d.

M. MILES, Lansing,

H. R. GARDNER, Jonesville,

C. L. WHITNEY, Dowagiac,

Committee

CLASS XLIX—CLOCKS, JEWELRY, PLATED WARE, CUTLERY, ETC.

Louis Black & Co., Detroit, best set mathematical instruments, 1st, \$3 and diploma; best barometer, 1st, \$3 and dip.; best thermometers, 1st, dip.; best microscopes, 1st, recommended; best opera and marine glasses, 1st, recommended; best telescopes and spy glasses, 1st, recommended; best pocket compass, 1st, recommended; best assortment of spectacles, no competition, 1st, recommended.

H. Yentach, Detroit, one case jewelry, 2d, deserves prize for lapidary work.

F. J. Phelps & Co., Detroit, best general assortment of gas fixtures, 1st, recommended; best general assortment lamps, best exhibited; best assortment bronze statuary, 1st, recommended; best assortment bronze clocks, 2d, recommended; best assortment glass ware, 1st, no competition.

M. S. Smith & Co., Detroit, best collection of household and parlor clocks, 1st, \$3 and dip.; best collection of silver and plated ware, 1st, \$5 and dip.; best collection of table cutlery 1st, \$3 and dip.; best American watches, 1st, recommended; best collection staple and fancy goods, 1st, recommended; best collection jewelry and diamonds, special, 1st, recommended. Destoppelaire Bros., Detroit, best carved clock case, 1st, recommended.

G. H. Barnard, Detroit, one model ship, 1st, recommended.

Louis Black & Co., Detroit, stereoscopes and views, 1st, recommended—no competition; parlor clocks, 1st, recommended.

C. H. Dunks, Detroit, one case gold pens, 1st, recommended.

Austin Burt, Detroit, equatorials extant, 1st, recommended.

A. R. Morgan, Detroit, case fine skates, 1st, recommended.

H. Yentach, Detroit, exhibited lapidary work which is deserving of a first premium.

One case of crown diamonds, by M. S. Smith & Co., Detroit, is worthy of a first prize.

L. P. DURKKE, Pontiac,

K. J. F. ROEHM, Detroit,

J. H. ALLISON, Detroit,

Committee.

CLASS L—HENDLE, WAX, SHIRL AND OTHER FANCY WORK.

Miss Jennie Grant, Detroit, one table cover, 1st, dip. and \$3; one fire-screen, 1st, \$1; one braided tea cosy, 2d, \$1.

R. C. Willson, Detroit, largest stock, best made hair jewelry, 1st, \$3; ladies' and gentlemen's wigs, 1st, dip.; best specimen of ornamental hair work, 1st, \$3.

Mrs. Louis Stephenson, Detroit, best hair wreath, 2d, \$3.

Isabella J. Cox, Detroit, best crochet shawl, 1st, \$3.

Mrs. E. A. Booth, Detroit, best moss and shell bouquet, 1st, \$1.

Mrs. F. Leslie, Dearborn, best darned stocking, 1st, dip. and \$1.

C. P. Rabaut, Detroit, best specimen lace embroidery, 1st, \$3; best specimen lace shawl, 1st, dip.; best collection of laces, 1st, dip.

(The above were the finest assortment of laces ever exhibited in the city.)

C. P. Rabaut, Detroit, best embroidered window shade, 1st, recommended.

- Miss Mary E. Atwood, Detroit, best specimen of hair work, 1st, \$2.  
 Mrs. J. A. Bailey, Detroit, one basket of wax flowers, 2d, \$2.  
 Mrs. S. P. Wilcox, Detroit, one shell wreath, 2d, \$3. (By a child eleven years old—very nice)  
 Miss Nettie Lansing, Detroit, one bead pin-cushion, 1st, dip.; one child's cape, 1st, \$1;  
 one doll's red riding hood, 1st, \$1; one chemise yoke, 1st, \$1.  
 Miss Eva Hawley, Detroit, best wax flowers, 1st, \$3.  
 Mrs. Diedrich, Detroit, best worsted bouquet, 1st, recommended.  
 Mrs. H. H. Cargill, Detroit, one embroidered night robe, 2d, \$2.  
 Mrs. M. H. Messe, Detroit, best collection of needle work, 1st, dip. and \$3; three embroidered flannel skirts, 1st, \$2; one pair embroidered red slippers, 1st, \$1.  
 Mrs. McGarry, Detroit, one velvet cloak, 2d, \$2.  
 Mrs. W. G. Plain, Detroit, one bouquet of dried grasses, 1st, \$3.  
 Miss Susie A. Moore, Detroit, specimen of needlework, by a girl of nine years, 1st, \$3.  
 Mrs. Berry, Detroit, best collection of ornamental work, 1st, \$5.  
 E. S. Wynberger, Detroit, English lace mantilla, of Michigan manufacture, 1st, dip.  
 Maria Gough, Detroit, best collection embroidery by one person, 1st, \$6.  
 Miss Leonora Collar, Detroit, best specimen worsted work, 1st, \$3.  
 Mrs. C. G. Beaumont, Detroit, best specimen bead work, 1st, \$3.  
 Mrs. Geo. W. Watson, Detroit, best specimen needlework, 1st, \$3.  
 Mrs. C. G. Beaumont, Detroit, best specimen worsted work on broadcloth, 1st, \$3; best specimen silk embroidery on canvas, 1st, \$3.  
 J. M. Stevens, Detroit, one seed wreath, 1st, \$2.  
 Miss Nina Ingalls, Detroit, two toilet mats, 1st, \$3.  
 Mrs. C. Mitchell, Detroit, one Afghan robe—raised worsted work, 1st, dip.  
 Mrs. W. H. Cleveland, Adrian, one infant's Afghan, 1st, \$3; one embroidered cap, 1st, \$3;  
 one set toilet mats, 1st, \$3; dahlia mats, 1st, \$1; pearl ear rings and pin, 1st, \$1; one cotton  
 crochet tidy, 1st, \$1.  
 A. M. Wand, Kalamazoo, one Afghan—worsted work, plain, 1st, \$2.  
 Mrs. Lewis Stevenson, Detroit, sample worsted work (Lord's Supper,) 2d, \$2.

MRS. K. C. BARKER,  
 MRS. E. N. FIELDS,  
 MRS. HATTIE LINCOLN,  
 MR. C. H. LINCOLN,  
*Committee.*

#### DIVISION I.

##### CLASS LI.

- Hubbard & Davis, Detroit, greatest variety of roses, 2d, \$3; 12 dissimilar bloom, 1st, \$3;  
 greatest variety of verbenas, 1st, \$3.  
 James Vick, Rochester, N. Y., best and greatest variety of flowers skilfully grouped, 1st,  
 \$3; collection German asters, 1st, \$2; seedling foxes, 1st, \$3; collection of gladioli, 1st, \$3.  
 Wm. Adair, Detroit, 20 green house plants, 2d, \$5; 10 green house plants of different spe-  
 cies, 2d, \$3; greatest variety dahlias, 1st, \$4; floral design, 1st, \$3.  
 Mrs. E. Perkins, Birmingham, flat bouquet, 1st, \$1; basket flowers, 2d, \$1.  
 John Ford, Detroit, 20 green house plants, 1st, \$3; 10 green house plants, 1st, \$5; greatest  
 variety of hardy annual flowering plants in bloom, to be named and shown either in pots  
 or collection flowers, 1st, \$5; bouquet, round, 1st, \$1; greatest variety foxes, 1st, \$3.  
 Hubbard & Davis, Detroit, basket of flowers most tastefully arranged, 1st, \$2.  
 E. Farrand, greatest collection of gladioli, \$3.

To the splendid collection of gladioli of many choice varieties, entered by E. Farrand, we have awarded the second premium and diploma.

Mr. Adair sends two fine specimens of tree myrtle, which are considered worthy of special notice, as the oldest specimen of healthy plant growing.

In presenting this report the committee would say that the show of flowers was very fair, when we consider the unprecedented drouth with which our State has been visited, making their cultivation a work of care and painstaking. A fine contribution from Mr. Vick, of Rochester, N. Y., added much to the exhibition.

To a "green bay tree," exhibited by N. Bour, of Grosse Point, we recommend a discretionary premium.

L. R. PARMELEE,  
MRS. E. N. WILLOOX,  
MRS. F. W. FAIRMAN,  
MRS. BENJ. FOLLETT,  
*Committee.*

#### CLASS LII—FLOWERS, "AMATEUR."

N. Bour, Grosse Point, one bay tree, rare and curious, discretionary recommended.

James Toms, Ann Arbor, one case pansies, \$2.

There is no premium offered for pansies, which your committee think a great mistake, and would recommend a first premium for the exceedingly fine collection, No. 166, exhibited by Mr. Toms, of Ann Arbor.

MRS. F. FAIRMAN,  
MRS. E. N. WILLOOX,  
REV. E. P. POWER,  
*Committee.*

#### CLASS LIII—COLLECTION OF FRUITS BY DISTRICTS.

John Gilbert, Ovid, collection of fruits, 6th Congressional District, 21, \$50.

Sam'l Hopkins Breedsville, collection of fruit, third Congressional District, 1st, \$100.

T. B. Tooker, Howell, collection of fruit, Congressional District, 3d, \$25.

Note.—Taking into consideration the variety exhibited, the 3d Congressional District is awarded the first premium. If the committee were called on to decide on apples alone, the 6th District would be entitled to the first premium, the exhibition from that District, especially of winter fruit, being very fine.

J. A. LAW,  
JOHN RISEG,  
S. P. WILLIAMS,  
*Committee.*

#### CLASS LIV—SEEDLING FRUIT AND NEW VARIETIES.

Hubbard & Davis, Detroit, seedling pears, 1st, Downing's Landscape Gardening.

From the specimen of seedling pear exhibited, as No. 45, your committee cannot judge perhaps fully of the merits, as they are not in season to test their quality, but would feel warranted in awarding the premium offered by the Society, etc.

Your committee would state they have examined nearly all the fruit on exhibition, and corrected to the best of their ability the errors in nomenclature. All of which is submitted.

H. DALE ADAMS,  
*Chairman.*

## CLASS LV—APPLES—AMATEUR.

Samuel Rappleye, Ridgeway, Lenawee, best 20 varieties apples, including proper succession for family use, 1st, \$20.

Wm. F. Bradner, Redford, 2d best 20 varieties apples, including proper succession for family use, 2d, recommended.

Samuel Rappleye, Ridgeway, Lenawee, best 12 varieties apples, including proper succession for family use, 1st, \$12; best six varieties apples, including proper succession for family use, 1st, \$7.

Wm. F. Bradner, Redford, 2d best six varieties apples, including proper succession for family use, 2d, recommended.

Samuel Rappleye, Ridgeway, Lenawee, best exhibit of summer apples, 1st, \$4; best exhibit of winter apples, 1st, \$4.

Edward Parsons, Detroit, best exhibit of autumn apples, 1st, \$4.

Wm. F. Bradner, Redford, best 12 specimens of any variety of autumn apples, 1st, \$3.

The committee finding no entries for second premium, thought best not to use any discretion, and only report on those found properly entered.

J. I. ELLIOTT,  
GEO. H. TUXBURY,  
J. W. HUMPHREY,  
*Committee.*

## CLASS LVI—PEARS.

E. T. Douglas, Detroit, 12 varieties of pears, including a proper succession for use, 1st, \$10.

Samuel Rappleye, Ridgeway, six specimens autumn pears, 1st, \$2.

D. S. Osborn, Detroit, collection of autumn pears, named and labeled, 1st, \$5.

From the way that the entries were made, these are the only premiums that we can award. Had the entries been made in a different manner, our awards would in some respects have been different. And we wish to notice especially the fine collection of pears exhibited by D. S. Osborn, of Detroit.

G. V. N. LOTHROP,  
B. G. BUELL,  
WM. ADAIR,  
*Committee.*

The undersigned cannot pass the very fine collection of pears exhibited by their associate, Mr. Geo. V. N. Lothrop, which were not surpassed by any on exhibition, but which he declined to have in competition for the premiums

WM. ADAIR,  
B. G. BUELL,

## CLASS LVII—PEACHES, PLUMS AND OTHER FRUITS.

Samuel Hoppen, Breedsville, best 10 varieties peaches, 1st, \$8; best 6 varieties peaches, 1st, \$3.

D. N. Leonard, St. Joseph, best 6 single varieties of freestones, 1st, \$1.

B. McCreery, Detroit, best collection plums, 1st, \$5.

Stephen Smith, Detroit, best 12 plums, 1st, \$2.

Wm. Sowersby, Detroit, best 12 quinces, 1st, \$3.

Wm. Larkins, Detroit, best 2 watermelons, 1st, \$2.

John Ford, Detroit, second best 2 watermelons, 2d, \$1.

Samuel Rappleye, Ridgeway, best specimens muskmelons, 1st, \$2.

John Ford, Detroit, second best specimens muskmelons, 2d, \$1.

LEWIS S. LOVELL,

A. C. HUBBARD,

*Committee.*

CLASS LVIII—APPLES.

Hubbard & Davis, Detroit, best 20 varieties of apples, proper succession for family use, 1st, \$20; best exhibit of summer apples, 2d, \$3; best exhibit of autumn apples, 1st, \$6; best exhibit of winter apples, 1st, \$10; best 12 specimens, single variety, summer apples, 1st, \$3; best 12 specimens, single variety, autumn apples, 2d, \$2; best 12 specimens, single variety, winter apples, 1st, \$3; best single variety of winter apples, 2d, \$3.

J. L. Ilgenfritz, Monroe, 12 specimens of autumn apples, 1st, \$3.

S. O. KNAPP,

*Committee.*

CLASS LIX—PEARS.

J. L. Ilgenfritz, Monroe, best 12 varieties of pears, including proper succession for use, 1st, \$10.

Reynolds & Lewis, Monroe, second best varieties of pears, including proper succession for use, 2d, \$6.

Hubbard & Davis, Detroit, third best varieties of pears, including proper succession for use, 3d, \$3.

J. L. Ilgenfritz, Monroe, 8 varieties of pears, including proper succession for use, 1st, \$3.

Hubbard & Davis, Detroit, five varieties pears, including proper succession for use, 1st, \$2; best collection of autumn pears, 1st, \$3.

J. L. Ilgenfritz, Monroe, best 6 specimens of summer pears, 1st, \$2; best 6 specimens of autumn pears, 1st, \$2.

Hubbard & Davis, Detroit, best 6 specimens of winter pears, 1st, \$2.

G. V. N. LOTHROP

B. G. BUELL,

WM. ADAIR,

*Committee.*

CLASS LX—PEACHES, PLUMS AND OTHER FRUIT—PROFESSIONAL.

No report in this class.

CLASS LXI—GRAPES.

Benj. McCreery, Detroit, best collection of foreign grapes, 1st, \$3; best 6 varieties of foreign grapes, 1st, \$4; best 3 varieties of foreign grapes, 1st, \$2.

G. R. Hurd, Monroe, one variety of native grape, "Concord," 1st, \$3.

John W. Riseg, Monroe, 5 varieties native grape, 1st, \$2.

T. J. Haywood & Co, Detroit, 8 varieties native grape, 1st, \$3.

*Note.*—The exhibition of grapes was unusually large, and some varieties not coming under the rules, entitling them to a premium, deserve especial notice. Among them we note Rogers' Hybrid No. 15, Union Village, and the mottled grape. They are in the class

that claim a more extended notice. The Concord, as a native grape, presented from different sections, attracted general attention, and deservedly so.

S. P. WILLIAMS,  
JOHN RISEG,  
CHARLES MELLERS,  
E. P. ROBERTS,  
*Committee.*

# DIVISION K.

## CLASS LXII—MISCELLANEOUS.

- Alex. L. Patrick, Detroit, excelsior machine, dip.  
J. L. Childs & Co., Detroit, fire extinguisher, dip.  
G. B. Smith, Agent, Detroit, rock plaster, from alabaster, \$2; ground plaster from alabaster, \$3.  
F. Sumner, Detroit, one fence, dip.  
H. St. Clair, Detroit, embalming process, dip.  
G. A. Farwell, Detroit, rotating ventilator, dip.  
John Tull, Monroe, self-operating swing, dip.  
C. & P. Mellus, Detroit, circular saws, dip.; Mixton's upset and sharpener, dip.  
Clappen & Phillips, Detroit, show case and counter, dip. and medal.  
G. B. Wormer & Son, Detroit, improved head turner, dip.  
G. B. Wormer & Son, Detroit, one shingle and head machine, dip.; wheel joiner, dip.  
Allen Chaney, Detroit, of Detroit Agricultural Works, iron carriage step, dip.  
Michigan Concrete Stone Company, Detroit, manufactured stone, dip.  
L. D. F. Armstrong, Detroit, Brittan's copper strip lightning conductor, dip.; combination window sash, superior, dip.  
Peter Morler, Detroit, one cable stopper, dip.  
E. M. Benster, Detroit, barrel heading machine, silver medal.  
Wm. A. Gray, Columbus, Ohio, iron cutter, punch and shrinker, silver medal.  
Owen & Co., Detroit, dovetail machine, silver medal.  
E. T. Propper, Detroit, concrete brick, dip.  
Dewitt & Millus, ans't files, dip.  
Mechanics & Inventors, Detroit, Long's gear calculating rule, dip.  
Mechanics & Inventors, one locomotive spring balance, dip.  
Joseph Parks, Detroit, specimen of wood turning, dip.  
W. H. Sears, Detroit, specimen of stock and common brick, dip.  
K. Hamburger, patent wardrobe, dip.; patent easy chair, dip.; combination hammer, dip.; castor roller for tables, etc., dip.; patent fuel saving apparatus, dip.; patent car seat lock, dip.; patent detector for detecting frauds on railroads, etc., dip.  
Abner Hitchcock, Detroit, complete spring bed, dip.  
Dr. Rose & Cogswell, Detroit, two vice clamps, dip.  
Detroit Safe Co., Detroit, one lot safes, dip.  
Atzer Kruger, Detroit, two cases cigars, dip.  
G. W. Bowlsby, Monroe, steam engine cross head, dip.  
Austin Burt, Hamtramck, specimen pig iron, dip.  
L. J. Wheeler, Cleveland, O., one can opener, dip.  
Frank Burton, Detroit, miniature locomotive, dip.  
Michigan Salt Co., East Saginaw, barrel solar salt, 1st, \$5; case of sample solar salt, 1st  
C. Domine, Detroit, one Domine refrigerator, dip. and silver medal.

- S. Layton, Logansport, Cass county, Indiana, one screw cutting machine, dip.  
 American Grain Grader and Separator Company, Chicago, one model of Chase and Tiffany's grain grader and separator, dip.
- Palmer Hamilton, Detroit, one oscillating saw-hanging, 1st, silver medal.  
 D. Wilkie & Co., Detroit, tin smith and plumbers solder sample, dip.  
 P. Demington, Du Quoin, Ill., one spoke lathe, dip.  
 Robieson, Thomas & Co., Detroit, picture backing, dip.  
 American Fence Co., Cleveland, one fence model, 1st, silver medal.  
 R. F. Petyt, Hillsdale, automatic gate, dip.  
 John C. Goodale, Kalamazoo, one show case, dip.  
 D. E. Longsdorf, Mechanicsburg, Penn., one case sample patent paint, dip.  
 John Zimmerman, Royalton, Niagara, N. Y., lamp for destroying insects on trees, etc., dip.
- William Larter, Morristown, New Jersey, tanners' oil compound, for polishing, dip.  
 P. Marvin, Detroit, one burglars alarm, dip.  
 Cullen Brown, Detroit, machine for cutting leather fly nets, dip.  
 E. C. Roberts, Summit, Washtenaw, patent straight rail fence, dip.  
 Isaac T. Cram, Chicago, Ill., machine for forming horse collars, dip.  
 D. A. Minor, Clinton, Lenawee County, patent fastener for barns and other buildings, dip.  
 N. W. House, Adrian, rope-moulding machine, dip.  
 M. A. Carver, Little Falls, Herkimer County, N. Y., Carver's double-acting anti-frost pump, dip.
- John Lucas, Flint, model of a small steamboat, dip.  
 B. B. Chapin, Grand Blanc, Branches' older and wine press, dip.  
 Alma Bedford, Coldwater, patent window supporter, dip.; patent blanket fastener, dip., patent harness buckle, dip.
- M. M. Turner, Ann Arbor, great French secret for dress cutting, dip.  
 Henry Fowler, Detroit, six bronze and gold muff boxes, dip.; six blue muff boxes, dip.; six bronze and gold victorine boxes, dip.; six blue victorine boxes, dip.; six bronze and gold collar boxes, dip.; six blue collar boxes, dip.; six covers for sewing machine, dip.; eight shelf boxes, dip.; six shoe boxes, dip.; six tobacco boxes, dip.; six hat boxes, dip.; two dozen band boxes, of wood, dip.; one dozen band boxes, of straw board, dip.; one dozen confectionery boxes, board, dip.; a great variety of flower sample boxes, dip.
- J. B. Billings, Detroit, one marbled slate mantle, Spanish, dip.; one marbled slate mantle, black and gold, dip.; one marbled slate mantle, pyreneese, dip.
- E. T. Barnum, Detroit, cages, screen, boilers, and other specimens of wire work, etc., dip.  
 James Jenks, Detroit, one portable engine, dip.
- Jackson Fire Clay Works, Jackson, sewer pipe and tile, dip.; patent cone coupling, dip.; double cylinder planer and matcher, with beading attachment, dip.; one scroll saw, dip.; one shingle mill, dip.; best sawed M shingles, 1st, \$2.
- R. N. Short, Detroit, Fish's Improved Swede Iron, dip.  
 Samuel Males, Cincinnati, Ohio, Public Urinal, dip.
- Jason Hemenway, Deerfield, one external pivoted bucket waterwheel, dip.; one central discharge pivoted bucket waterwheel, dip.
- Andrew Goodyear, Albion, machine for ruffing and turning hubs, silver medal.  
 Y. Johnson, Kalamazoo, specimen of pressed brick, dip.  
 John Richard, Tecumseh, Clough's process for refining fluids, dip.
- E. T. Barnum, Detroit, one cheese safe, dip.  
 Steve Gregory, Jonesville and Hillsdale, best sample of work in American marble, silver medal.
- H. D. Martin, Ypsilanti, one pair leather string team nets, dip.  
 John Babcock, Frankford, N. Y., match-safe, Hall's patent, dip.

Wm. W. Platt, Jonesville, Andrews & Kalbach's turbine excelsior water wheel, dip.  
 Jones & Laughlin, Pittsburg, Pa., Patent Cold Rolled Shafting, dip.; Collin's Patent self  
 adjusting double compression coupling for shafting, dip.  
 J. B. Hanniman, Detroit, patent stove door handles and cover lifter, dip.  
 F. Windsor, Boston, Mass., work done with automatic turning lathe with planer, dip.  
 R. F. Petty, Hillsdale, Mich., one automatic gate, dip.  
 A. Forbes, Cleveland, Ohio, one refrigerator, dip.  
 P. Murry, Detroit, one shaking gate bars, dip.  
 Mechanics & Inventors, Detroit, one filter, dip.  
 Geo. W. Jenks, Howell, Mich., Clark's patent straw carrier, dip.  
 The entries could not be found to the number of 27; the balance we have awarded to  
 those we thought worthy.

GEO. C. MONBOE,  
 A. GALE,  
 E. B. ROOT,  
 H. ARNOLD,  
*Committee.*

#### DIVISION K.

##### CLASS LXIII—RAILROAD ROLLING STOCK.

M. E. & N. I. R. R. Co., Detroit, one passenger engine, 1st, silver medal.  
 M. E. & N. I. R. R. Co., Detroit, one passenger car, 1st, diploma.  
 M. C. R. R. Co., Detroit, one passenger car, 1st, diploma.  
 M. E. & N. I. R. R. Co., Detroit, one smoking car, diploma.  
 M. C. R. R. Co., Detroit, one Pullman palace hotel and drawing-room car, special, silver  
 medal.  
 M. E. & N. I. R. R. Co., Detroit, one European compartment car, special, silver medal.  
*Report of the Committee on Railroad Rolling Stock.*—The Committee appointed by the  
 Michigan State Agricultural Society, to examine railroad rolling stock, report:

That there was but one passenger engine on exhibition, which was placed there by the  
 Michigan Southern & Northern Indiana Railroad Company, to which the committee unani-  
 mously awarded the silver medal, which the society offers for the best passenger engine.

The committee also examined cars placed on exhibition by the Michigan Southern &  
 Northern Indiana and the Michigan Central Companies, to which they feel that more than  
 the passing notice of simply awarding prizes is due.

Each company exhibits a passenger car which seems to be perfect in its arrangements for  
 the comfort and convenience of passengers—better than anything the committee had ever  
 before seen—thoroughly ventilated, light, airy, and free from dust, with six wheel trucks,  
 which so counteract the usual jar of a car in motion, that it was difficult to realize that  
 you were traveling.

The committee offer to each of these companies the diploma offered by the society for the  
 best passenger cars.

The Michigan Southern & Northern Indiana Railroad Company also exhibited a smoking  
 car, with seats arranged separately from each other, and on pivots, which surpasses any-  
 thing the committee have ever seen, in consulting the comfort of passengers.

There being no premium offered for smoking cars, the committee recommend the award  
 of a diploma to the M. E. & N. I. R. R. Co. for this car.

But the committee desire to call especial attention to two improved cars, one exhibited  
 by each of these companies, and each of which is almost as great an improvement in the  
 comforts of railroad traveling as the railroad itself was an improvement over the old stage  
 coach.



The Michigan Central exhibited one of "Pullman's Palace, Hotel and Drawing-room cars," not built expressly for exhibition, but taken out of a regular train to be shown to us. This car should be described as a combination car. As it combines in itself three distinct purposes, each of which is as perfectly secured as if it had been built for that and no other purpose. It is the most perfect sleeping car that has ever been made, and will accommodate 60 persons with as perfect sleeping apartments as are ordinarily secured at first class hotels. At the same time it is a saloon, or dining car, where facilities are furnished for that purpose equal to those furnished by the very best eating-houses, and all while the train is in full motion. Still again by a very simple change it appears before you as a beautiful and most luxurious traveling car.

When used for this last purpose, the furniture, which, as if by the touch of magic, will be brought out when wanted for the two first named purposes, is so closely and elegantly placed back that it appears only like rather elaborate ornamentation. A portion of each end of this car is divided off into separate state rooms, which may be entirely closed up if desired, with passage ways passing around them, while the central part of the car is arranged into double berths, not unlike the ordinary sleeping cars. This car rides so steadily that we found no difficulty in writing on a table when going at the rate of twenty-five miles an hour. The committee have no hesitation in pronouncing this the most perfect arrangement for continuous night and day traveling they have ever seen or heard of, and it is difficult to conceive that it can be improved. There is no premium offered for any such car as this, and the committee, feeling a degree of pride that it should have been brought out by a Michigan company, recommend to the Executive Committee of the State Agricultural Society that, as a special premium, a silver medal be awarded to the Michigan Central Railroad Company for the "Pullman Palace, Hotel and Drawing-room Car."

The Michigan Southern & Northern Indiana Company exhibited a most beautiful car, called the European Compartment Car, built at their works at Adrian, Mich. In the construction of this car, instead of the usual style of arranging the seats, the car is divided into several compartments, large enough to accommodate from four to ten persons each. Each compartment may, if desired, be entirely closed up by itself, so that no one shall enter it but the parties entitled to do so, and each is furnished with suitable chairs, sofas, tables and toilet arrangements; so that while traveling at the rate of 30 miles an hour you can hardly divest yourself of the idea that you are in a gentleman's parlor. This car, being also built upon trucks with six wheels, has the same steady bearing when in motion before spoken of, and no difficulty was experienced in writing on a table when going at the highest rate of speed. This car makes no pretensions to sleeping arrangements, but it fills up what has always been considered a great desideratum in railroad traveling, viz: It affords an opportunity for a party who may desire it, to be by themselves, and is most perfect in all its arrangements. The committee recommend that a special premium of a silver medal be awarded to the Michigan Southern & Northern Indiana Railroad Company for the "European Compartment Car."

The superintendents of these roads attached these cars all together and proposed to the committee to take a short ride, in order that they might demonstrate to us how perfectly they accomplish the purposes for which they were designed.

Your committee, therefore, having witnessed their operations, speak knowingly of all the various workings of these cars, and they confess to a degree of pride at this manifestation on the part of these Michigan companies to maintain the enviable position which they have already achieved in the railroad management of the West.

R. E. TROWBRIDGE, *Chairman.*

SAFETY LAYTON, Logansport, Ind.,  
BENJAMIN VERNOR, Detroit,  
WILLIAM DUNCAN, Detroit,  
TALCOTT E. WING, Monroe,  
GEORGE H. GALE, Kalamazoo,  
E. O. GROSVENOR, Jonesville,

*Committee.*

## REPORTS OF SPECIAL COMMITTEES.

## REPORT OF THE COMMITTEE ON FARMS.

*Committee*—C. W. Greene, Farmington; John Allen, Plymouth.  
*To the President and Executive Committee of the Michigan State  
Agricultural Society:*

GENTLEMEN—The undersigned, having been appointed a committee to examine and report on the farms entered for the Society's premium of \$100, to be awarded to "the best cultivated and most skillfully managed farm of not less than 160 acres in extent," respectfully report:

There were three entries, viz: the farm of Lysander Woodward, of Rochester, Oakland county; the farm of E. L. Boyden, of Webster, Washtenaw county; and the farm of E. W. Rising, of Richfield, Genesee county.

It may not be improper before proceeding to the description of the entries and the rendering of our decision, to submit a few preliminary remarks relative to the design of the State Agricultural Society in offering this premium, by way of indicating the general principles by which the committee were governed, and also as showing its utility as a means of directing the agriculture of the State towards a system of improvement, tending to develop more thoroughly the resources of the soil than that of the surface. Up to the present time the general system of agriculture in Michigan has been governed largely by the necessity which has compelled each farmer to apply all his abilities and skill to the clearing and amelioration of the surface of his land. Hence, it has been only from the soil nearest to the surface that he could look for his crops. The greater the surface he could till, the more his returns. But the time has come when our system must be changed in all that part of the State in which the surface has been thoroughly subdued, and where it has been tilled for a long term of years. We are warned of the necessity of this change by the lessened production of our fields that have been longest under cultiva-

tion. Farms that formerly produced from 30 to 40 bushels of the choicest wheat to the acre, now seldom yield over 20 to 25 bushels, and in many cases the wheat itself is not the white, but the coarser amber, or red varieties. Where this average yield is exceeded, it is upon the new and recently cleared lands, where the soil is yet rich in the elements of fertility with which nature has supplied its surface. The aggregate crops of the State exemplify this statement. The total produce of wheat by the State for the past year, as recently compiled by the Secretary of the Board of Trade of Detroit, shows that the whole crop, including the surplus for export, the amount used for home consumption, and for seed, does not exceed 11,000,000 of bushels. The number of acres of improved land in the State at the present time is reckoned at 6,000,000, of which, if we take one-fifth, as set off each year for the production of wheat, (and this is really less than the usual proportion,) we find we have 1,200,000 acres, from which the crop is grown, and that the average yield per acre is less than *ten* bushels. It ought to be at least 15. In other productions, the farmers of the State are, of course, largely governed by the production of the main crop, and it is in a great degree the measure of our agricultural standing. One of the most important duties of the Society is to correct and amend the imperfect system of culture which now prevails, and before being able to suggest the necessary changes, it is important to know exactly upon what system the practice of the best farmers in the State is based; how far they have advanced in the treatment of the soil by the adoption of processes of improvement and amelioration now made known to be requisite by science and direct experiment; and what have been the results so far of the best practice known to our State agriculture. It is with these general views that we proceed to lay before the Society the following descriptions of the farms, their general condition, their production, their cost of management and their gross and net returns per acre:

## FARM OF L. WOODWARD, OAKLAND COUNTY.

The farm of Lysander Woodward is situated in the town of Avon, Oakland county, within a mile and a half of the little village of Rochester, and about ten miles north-west of the city of Pontiac. It contains 340 acres, of which about 275 acres may be considered as under cultivation or improved. The surface is rolling, and on the south-east is somewhat broken into hills and bluffs, with flats and intervalle land between them and the creek that runs through the farm and empties into the Clinton river. This broken surface in part affects the divisions of the farm and its fencing, and tends to make them irregular where it prevails. The soil of the farm would be termed a medium light sand, with a large tract of bottom land resting on a somewhat compact gravelly subsoil. Part of the light land on the higher knobs or knolls is a light drifting sand, but on the stronger portions the soil has an admixture of a stiffer, loamy matter, with stone and gravel. There are some extensive bottoms along the creek, and a considerable tract of marsh or peaty land, in all between 40 and 50 acres. About ten acres of the bottom land has been thoroughly cleared. The remainder was chiefly used as a wild pasture, the fallen timber and stumps not being as yet in condition to remove. Mr. Woodward commenced on this farm about twenty years ago, when the land was in the state that nature had given it, and all the improvements have been made by himself.

## DIVISION AND BUILDINGS.

The farm contains ten fields, ranging in size from nine acres to eighty-eight acres. The average size of the divisions, however, is designed to be from twenty to thirty acres. The public road north and south affords ample communication with the fields on one side of the farm, and a broad lane or private road passing through his yards and in front of his farm buildings extends almost to the west line, and gives easy communication with the outlying fields. The lane or private road is about three rods from centre to centre, a width we consider to be too

narrow to be truly economical. The fences on the farm were the usual rail fence, all in good order and evidently kept in good condition. The gates connecting the yards were of good quality, but those connecting the fields were light and not commendable.

The farm house is a modern structure, well planned and economically arranged in the interior. Its location is well chosen, being on a rise of ground overlooking the main road, and a sufficient distance back to afford room for pleasant ornamental grounds in front. At present, however, we consider the grounds as too narrow, and though in good order and neatly planted with evergreens and flower borders, yet the defect of breadth gives this feature of the surroundings of the mansion connected with a farm of this size, too much the character of a suburban yard, and we refer to this point as a subject worthy of greater attention on the part of those laying out and forming homesteads, than it usually receives. On this farm there have been built three tenant houses for the accommodation of the labor requisite without making it an oppressive tax on the household. These structures were neat and commodious, and, as we considered, well adapted to the purposes for which they were designed. The barns and buildings were ranged along the north side of the private road, at a convenient distance north and east of the house, and set back so as not to interfere with the prominence that naturally belongs to it, from approach on either side of its front. This location, also, as compared to the location of buildings close to the road, permits a more complete and free arrangement of yards, and a greater choice in the addition of buildings as they may be found necessary from the changes incident to the improvement of large farms. A well appointed horse barn, with a basement in which the cattle and milch cows are housed, and near it a poultry house and yard, a neat structure for feeding and fattening swine, and a large corn crib adjacent, were the out-buildings nearest the house. Then a large grain and sheep barn connected with yards for the division and care of his large

flock. This latter has been built with a reference to being fitted for stock of any kind, as it has a stone basement nine feet in height, which forms at present the winter shelter for the flock, and overhead a frame barn 95 feet long and 40 feet in width, with 16 feet posts. The interior arrangements in all these buildings were fair and complete, though not to be considered perfect. The general arrangement here was non-connection and the independence of each building from the other, a system that has its peculiar advantages.

#### DRAINS.

On this farm there has been laid down about 500 rods of drain tile. The tiles were of the horseshoe pattern, and laid on narrow boards, at an average expense of \$1 per rod. This improvement so far had been applied principally to bottom lands where springs had rendered the surface unproductive, and the result has been to make productive a large section which had previously been of no value. Mr. Woodward was of opinion that he could readily use at least 1,000 rods more of tile drains to advantage, and in this the committee entirely agreed with him, being fully convinced that the result of the experience gained by laying down the next thousand rods would lead to the conviction that even double that amount might be put in with a certain prospect of remunerative returns for the requisite investment. In this connection it may not be improper to state that the experience of the committee lead them to condemn the use of the horseshoe tile, when either the sole or the circular tile can be obtained, but aware of the difficulty of having any choice, we conceive that it may do some good where tile factories are being established to direct attention to a subject that is becoming each year of more and more importance to the farmer who would improve his land.

#### SYSTEM OF TILLAGE.

The system of tillage pursued on this farm is first to break up to the depth of seven or eight inches the land seeded to clover, having drawn out the manure from the barn as fast as

made, and in its fresh state, during the fall, winter and spring. The amount of manure made and applied at this rate was estimated as equal to ten loads per acre. The field is planted to corn, which yields at the rate now of 35 to 40 bushels per acre. The next year either oats or barley is grown, but the preference seems to be oats; this crop yields an average of 30 bushels per acre. Wheat follows, the oats or barley stubble being plowed under, and this crop yields now an average of 12 bushels per acre, the variety grown being red. After wheat the field is seeded down to clover, with which timothy is now intermixed. But when the land was first brought under cultivation, clover had to be sown alone, as timothy would not grow. The successful treatment of this farm is derived largely from the liberality and care with which it has been manured, and heavy crops of clover plowed under. In this connection Mr. Woodward has used, as he deems very successfully, the Hungarian grass, plowing up in the spring the land designed for wheat, and which had been seeded to clover, sowing it with Hungarian grass and then plowing under the standing crop just previous to the sowing of his wheat in the fall. The result of this has been an increase in his crops of wheat from an average of nine or ten bushels to twelve bushels per acre. His grass lands now yield him an average of one and a half tons of timothy per acre. It will be seen that this rotation does not exceed five years. But he has husbanded his resources so far that the production of his land shows a general increase. During the first ten years of his experience with his farm, timothy grass would not grow, corn ranged only from 20 to 25 bushels per acre, wheat not over ten bushels, and oats not over 20 bushels. For the last three years, his oats average 30 bushels, wheat 12 bushels, corn 35 to 40, while his crops of hay have been of more value, both in quantity and quality.

In connection with the feeding of his stock, and as a part of the farm work, Mr. Woodward raises six hundred bushels of potatoes, and one thousand bushels of rutabagas.

## LIVE STOCK.

The live stock on this farm consists of two spans of horses, of good size and well selected for work, and one horse for general use. He raises no horses for sale, and breeds none. Of cattle he keeps about twenty head of fair grade stock, which includes four or five milch cows and their produce. Of sheep he has a flock of three hundred head, which may be classed as high grade merinos. His stock of hogs are a cross of Suffolk and White Chester, and number twenty, including store and breeding swine. The ratio of his farm is that the improved land sustains one horse on every fifty-five acres; one head of cattle on each thirteen and three-fourths acres; one hog on each thirteen and three-fourths acres; one sheep to each acre. The committee consider this farm stocked fairly up to the capacity of the land, and of its condition so far as improved.

## PRODUCTION.

Mr. Woodward gave us a statement taken from his books, of the actual sales from the farm for the years 1865 and 1866, and the sales for this year so far as they have been made, with the amount of produce on hand at the market rates. These returns are as follows:

	1865.	1866.	1867.
Corn, .....	\$ 216 70	.....	\$ 600 00
Wheat, .....	1,199 88	\$ 1,445 60	1,161 82
Potatoes, .....	98 98	78 56	200 90
Wool, .....	1,136 96	474 24	356 04
Sheep sold, .....	493 76	345 00	307 50
Barley, .....	45 92	167 00	.....
Cattle, .....	421 41	563 50	215 00
Pork, .....	.....	499 80	300 00
Horses sold, .....	.....	210 00	.....
Grass seed, .....	.....	6 00	32 63
Hay, .....	.....	11 17	.....
Clover seed, .....	.....	.....	150 00
<b>Total, .....</b>	<b>\$ 3,613 60</b>	<b>\$ 3,800 87</b>	<b>\$ 3,222 99</b>
Add the keeping of two cows for men, \$52; produce of two acres, \$20, .....			72 00
			<b>\$ 3,394 99</b>



## FAMILY SUPPLIES.

The committee, for the purpose of obtaining as precisely as possible, the exact productiveness of the farm, made a critical examination into the amount of articles produced, and which are consumed in the support of the family, and of the labor in addition to what had been sold. The family, on an average for the year, consisted of nine persons, and these persons consumed of marketable articles, which do not include house rent, wood, water, etc., as follows:

The produce of five cows, .....	\$ 150
Wheat for bread, 100 bushels, .....	230
Pork, 1,000 pounds, .....	70
Potatoes, .....	50
Fruit from the orchard, .....	50
Vegetables and products of the garden, .....	50
The produce of the poultry yard, .....	35
Beef and mutton produced on the farm, .....	40
Total consumption of farm produce, .....	<u>\$675</u>

## LABOR.

From this it will appear that the total production of the farm for the year, amounts to \$4,069 99, or an average of \$14 80 per acre of improved land.

The cost for labor, repairs, iron and implement work to keep up the stock for the year was \$1,089 70. Adding this to the amount of produce consumed by family, and we have a total of expenditures of \$1,764 70, showing that exclusive of team work, it actually costs on this farm an average of \$6 40 per acre per annum to work it, and that on the capital invested in the land and improvements, when we deduct the cost of labor and the support of family, as representing the return the farmer is entitled to for his superintendence and personal labor, we have a balance of \$2,395 29, or a net dividend of \$8 40 per acre.

## FARM OF E. L. BOYDEN, OF WEBSTER, WASHTENAW COUNTY.

The farm of E. L. Boyden is situated in the township of Webster, Washtenaw county, about six miles north-west of the town of Ann Arbor, and a mile and a half from Delhi station, on the Michigan Central Railroad. It contains 520 acres in the whole tract, out of which 365 are improved and cleared, in whole or in part. This farm was originally taken up about forty years ago, by Mr. Boyden, senior, one of the original settlers of this part of the State, whom we took pleasure in meeting, and whose skill and labor were testified to on every side. The farm is remarkable for its level surface, that stretches out as a part of a great plain, broken only on the east by what was once a tamarack marsh, but which is now drained by open ditches. On the north side the land is more rolling, as it descends gently toward a swale that drains the surface into a little brook, which empties into the Huron river. The soil is the gravelly rich loam, intermixed occasionally with a light clay, which is known as a burr oak soil, and is one of the best and richest and most easily worked in the State. The marsh land extends over some 40 acres, but is all subdued, so far as to take off it about one ton of hay to the acre.

## DIVISIONS AND BUILDINGS.

The farm is laid off into eleven fields, with two or three small plots near the house for the convenience of stock. The fields range from ten acres to sixty-eight acres in size, but the average is three plots of twenty acres, four of thirty to forty acres, and one of sixty-eight acres, the latter being a large unplowed but cleared field, used for many years as a pasture. The fences are all in fair condition, and for the most part composed of rails, though the post and board fence was being introduced gradually as the rails wore out. The rails might be preserved much longer by having stone placed under the corners. The public road east and west ran through the south portion of the farm, and the house and barns were approached by a wide avenue, extending about twenty rods from the main road. Lanes of

an average width of four rods from centre to centre, lead east and west and north. The farm is bounded on three sides by roads. Gates, in good order, open into each lot from the lanes and roads, where necessary. All the fields are easily reached from the yards and buildings, by the lanes, which radiate from them as from a centre.

The farm-house is a large, roomy, old-fashioned, solid looking brick house, two stories in height, with a wing in the rear, and situate at the further end of a long lawn, about 20 rods from the road, which is bordered on one side by an old orchard, and on the other by the avenue that leads to the farm buildings. On either side of the lawn, and approaching the house and along the road in front, stood rows of stately, full grown locust and maple trees, with their branches now bare, but which, when in full foliage, must add greatly to the fine appearance of the farm buildings. Next to the orchard is the garden, in which is placed, within convenient access from the house, an ice house and milk room. The horse barn, swine yards and pens, and sheep pens were well planned, and contained work shops and other conveniences. The yards for the same were paved with cobble stone, as well as the entrances to the barns. There were two grain and hay barns, connected by 130 feet range of stables for cattle, with lofts for hay overhead. The various buildings and yards were connected and opened into each other. A range of framed corn cribs, 80 feet in length, stood outside of the yards and along the road that bounded the garden fence. A Fairbanks scale that had been awarded the first premium as a cattle scale, by the State Agricultural Society, was inclosed in a neat house near the gate that opened into the public road. A neat tenant house also occupied a lot on the south side of the same road, opposite the scale house. On this farm, all of the out buildings were in connection with each other, and were connected so as to form sides to the yards.

There were two orchards, one of them of very old trees, being grown from seed sown by Mr. Boyden when he first settled. These trees were decaying, many of the branches being dead,

and in some cases the trunks seemed blighted, or worn out on the side, indicating that forty years was about the life of the tree on this soil. The place of this orchard had been supplied by a new plantation of about six acres, in which the Wagener, the Rhode Island Greening and the Baldwin were the varieties relied upon for the main crop, though a few trees of a large number of other kinds were set out, with some pears and other fruit. The young trees were thrifty, and in a fine, healthy condition.

#### DRAINAGE.

There is on this farm about one mile of underdrain, made of largest sized tile. The drain is designed simply to take water from a basin in the centre of a large field, where a tendency to clay in the soil seemed to hold the water, and is designed rather for a sewer than a drain. There are 500 rods of open ditch, which so far has drained the marsh land, and afforded an out-fall for water where it was inclined to stand on the surface and prove injurious. The committee, however, from an examination of this farm, are of the opinion that as yet the benefits which would accrue from the introduction of a more thorough system of drainage, both on the marsh lands and some of the uplands, were but imperfectly understood, and had not yet been tested.

#### SYSTEM OF TILLAGE.

The system of tillage seems to be well adapted to the soil. The practice is to manure each year at the rate of forty acres of sod land, and to break it up to the depth of eight or nine inches, plowing with a pair of heavy cattle and team horses on each plow. The field is planted with corn. Next year barley is sown; the hoed corn that had preceded this crop rendering the soil clean, and peculiarly well adapted to this grain. The barley is followed by wheat. By this rotation, which is well adapted to the soil, there is little doubt but that the barley crop unquestionably gains, while something is taken from the wheat which follows. There are some peculiarities in the treatment of his corn, barley and wheat, that are worthy of notice. The

wheat grown is a handsome white wheat, now known in the neighborhood as the Boyden wheat, but which originated really from a spring wheat, being descended from a sample of Italian spring wheat sent for trial by a gentleman who had brought a number of kinds from Italy. As spring wheats they all failed, but three of them seemed to succeed as winter wheat, and finally what is known as the Boyden wheat was adopted, as proving an excellent winter wheat on his soil. All plowing on this farm is done with the double team, and to the depth of nine inches. Grain, both barley and wheat, (no oats are grown,) are drilled in at the rate of two bushels per acre; but the drilling is done both ways, the drill being gauged to sow a bushel per acre, passing over once. Grass, barley and corn are plastered, but it is believed that plaster injures wheat, at least such has been Mr. Boyden's experience. He generally sows 40 to 60 acres of wheat, and has never had a crop that averaged less than 20 bushels per acre. In some years he has raised as high as 40 bushels. The yield of wheat twelve to fifteen years ago, averaged from 30 to 40 bushels per acre, but for the past ten years it has been only from 20 to 30 bushels. The yield the present year was at the rate of 25 bushels. Barley has always been grown as part of the rotation on this farm. Formerly the average production was only 25 bushels per acre, but now it ranges from 30 to 40 bushels, and for the past three years the crop has been fully 35 bushels. The committee have seldom seen a finer crop of this grain, so excellent in color and so bright and plump in the berry; as the whole crop had just been threshed out, and cleaned, the opportunity of judging of its quality was not lost upon them. The corn grown upon the farm is the eight-rowed white flint. Sometimes in favorable seasons as high as 80 bushels of shelled corn has been grown per acre by actual weight. The crops now average from 50 to 75 bushels, but for the last two years the season has affected the corn crop on this farm unfavorably, and the average has only been 35 bushels. Potatoes are only grown for the use of the family, and roots only for feeding purposes. The hay crop

ranges from one and one-half to three tons of timothy and clover per acre, and generally cuts from 40 to 50 acres, besides about 40 acres of marsh or wild meadow, that yields from one to one and one-half tons per acre. He has not attempted to convert the produce of any part of his marsh into tame grasses. He preserves a large lot of 68 acres as a pasture for his cattle, and finds it really the most valuable for his milch cows. This lot has never been wholly plowed, and is quite marshy, nearly 40 acres growing coarse water grasses. In its present condition it is not in keeping with the rest of the farm. The committee believe that one single rotation of crops would pay the expense of having it skillfully and thoroughly underdrained throughout its whole extent, even though that expense ranged from \$25 to \$40 per acre. The thorough system of rotation so well adapted to the nature of the soil, the general neatness of arrangement, as well as the completeness and finished culture of the several fields, and the evident care and economy exercised in the management of the stock, the liberal employment of labor in and out of doors on this large farm, were satisfactory to the committee.

#### LIVE STOCK.

The stock of horses on this farm comprises two pair of horses for work, one horse kept for the use of the family, and two brood mares, of all work quality. The neat stock consists of 31 head, viz: A short-horn bull of good quality from the Uhl herd; eight milch cows mostly high grade short-horns, and some of them with a slight tinge of Devon blood; five head each of three-year olds, two-year olds and yearlings, and seven calves.

The swine were very fine, being a cross from a boar procured from the stock brought into this State by the Superintendent of the State Asylum at Kalamazoo.

The sheep kept on this farm were originally crosses with the Paular Merino, till Mr. Boyden found his flock had lessened so much in size that he lost in mutton more than he made up in

wool, and he then crossed once or twice with the Southdown and Leicester, and again used fine wool bucks, and he has now a flock of sheep, the ewes of which are remarkable for size, while the fleeces are heavy, clean and of a heavy grade of fine wool. The whole stock ranges annually from 350 to 400 head. The breeding ewes number 110, and he raised 128 lambs from them the present year. The ratio of this farm is that the improved land sustains one horse on each 52 acres; one head of cattle on each 10 4-10 acres; one head of swine on each 14½ acres; and one head of sheep to each acre.

#### PRODUCTION.

The actual production on this farm for the past two years does not show its full average, one of the crops (the corn) not coming up to the average which has been usual on such land. An examination of the returns, taken from Mr. Boyden's books, shows as follows:

Wheat sold, 714 bushels at \$2 50,.....	\$1,785 00
1,650 bushels of corn, (to be used on the farm).....	
920 bushels of barley at \$1 50,.....	1,380 00
Potatoes sold,.....	135 00
Wool sold at 40c per lb., 1,980 lbs.,.....	792 00
Fruit sold,.....	270 00
Horses sold,.....	50 00
Cattle sold,.....	510 00
Sheep sold,.....	557 00
Live and dressed pork,.....	425 00
Products of poultry yard,.....	100 00
Products of garden,.....	150 00
Products of dairy.....	260 00
Total,.....	<u><u>\$6,394 00</u></u>

#### FAMILY SUPPORT.

The cost of the produce obtained from the farm used in the family, is included in the above items, but the family consisted of an average of eighteen persons throughout the year, consuming as follows:

Produce of the cows,.....	\$190 00
Wheat, 200 bushels,.....	500 00
Potatoes, 100 bushels,.....	70 00
Produce of the poultry yard,.....	100 00
Produce of the garden,.....	150 00
Pork,.....	200 00
Fruit,.....	150 00
Total,.....	<u>\$1,360 00</u>
Amount paid for labor during the year,.....	1,450 00
Implement and repair account,.....	200 00
Total,.....	<u><u>\$3,010 00</u></u>

On this farm the cost of operating, when summed up, is an average per acre of improved land, of \$8 25. The whole produce of the farm averages, per acre, a return of \$17 50, and deducting the cost of operating, it leaves a net income of \$9 25.

#### FARM OF E. W. RISING, RICHFIELD, GENEESE COUNTY.

Thirteen miles east and north of Flint, in the town of Richfield, Genesee county, on the old State road leading north from Pontiac, lies the farm of E. W. Rising. It contains 200 acres of land, of which 170 are under improvement. It is just 16 years since the first timber was cut on this farm, which was originally heavy timbered, with maple, oak, basswood, ash and a few clumps of pine. The soil is clayey, with a mixture of gravelly loam, naturally strong, and well adapted to either wheat or grass, but evidently requiring a good deal of labor and time to get it subdued, and fitted for produce to its utmost capacity.

#### DIVISION.

The farm is divided into fifteen fields, ranging from five to eighteen acres, only two of the fields, however, more than ten acres. In fact we might say that here was a farm that almost had too much subdivision upon it to be economically systematized. The lane that passed through the farm in front of the



out-buildings was only two and a half rods in width, and was therefore considered defective. The farm being originally of heavy timber, it is as yet but imperfectly cleared, and though the energy and skill of the proprietor had made a large part of the surface adapted to the use of the improved machinery of the present time, it will be readily understood that time had not enabled him to make the surface of the whole farm perfect. At the time of our visit he had let out on contract the pulling of 300 stumps, at the rate of \$1 each, and these stumps were nearly all upon 12 acres, and did not include any that could be taken out without the use of a stump-puller.

#### BUILDINGS.

The farm house is a neat and convenient frame building with good cellar. The out-buildings consisted of a well-planned range, comprising horse barns, sheep barns, cattle stalls, situated on the south side of the lane and within a short distance from the house. Each of the several barns was provided with yards enclosed with good fences, and within convenient access of each other. The yards are paved with the rubble stone gathered from the surface of the farm.

#### DRAINS.

Mr. Rising has not done much experimentally in the way of draining. He has made about 500 rods with stone gathered from the farm, but has not used tile, and as yet knows nothing of the effect such drains would have upon his land. So far he estimates that his stone drains have increased the produce on the land in which they have been constructed, fully one-third. But he was not prepared to say that a general system would repay him, although his soil was evidently one of those which, when thoroughly drained and subsoiled, would be quickest to repay the capital invested.

#### SYSTEM OF TILLAGE.

The system adopted by Mr. Rising is one of the least exhaustive pursued in this State. Sod ground is well plowed

and cultivated, and planted to corn. The corn is followed by oats, which are seeded. The field then lies from three to five years in grass before it is summer-fallowed for wheat. The wheat is then seeded and it is let lie till ready to take it up for corn. There is no regular rotation. The system has been adopted as the best required for the clearing of the surface of a heavy timbered farm. During the past year there were 24 acres in corn, 15 acres in oats, 7 acres in spring wheat, and 4 acres in winter wheat. The balance, or 120 acres, was in grass, of which 45 was mowed for hay. He grows generally about an acre of potatoes and an acre of roots. Being engaged in filling heavy contracts for the delivery of logs for lumber, his market is at home.

#### CROPS.

His average yield of wheat is at the rate of 20 to 25 bushels. Where the land was first cleared, the average crop of wheat was from 30 to 33 bushels. In a favorable season he has raised 733 bushels of ears of corn off of  $4\frac{1}{2}$  acres of land. Spring wheat had yielded 20 bushels per acre. The corn usually planted was the white flint, and the average yield was 50 bushels per acre of shelled corn. Last year the crop was at the rate of 55 bushels. The oat crop is generally heavy, and an important crop on account of the demand for the supply of the lumberers. The yield this year has been at the rate of 50 bushels per acre, but he has grown as much as  $81\frac{1}{2}$  bushels.

#### ORCHARD.

An orchard was well located near the house containing 200 trees, about 12 to 15 years old, and which were in moderate bearing condition. The trees, so far as we could judge, indicated that the land on which they were planted required draining, many of them showing a gathering of moss on their limbs and branches, that foretold an early decay, if not counteracted by treatment that would give a greater vitality.

## LIVE STOCK.

Of cattle there are a pair of work oxen, 20 head of yearlings and two-year olds, and four milch cows. These are graded mostly with Shorthorn blood. Of horses there is one pair of work horses, one brood mare and ten head of young stock, all of them of the Victor strain of blood. The flock of sheep consisted of 130 head, of which about one-half was pure Spanish Merino, and the balance grades. Of swine there were ten head, of no special breed.

## PRODUCTION AND SUPPORT.

Mr. Rising gave us the production of his farm, for the year 1867: 195 bushels of wheat, 610 bushels of shelled corn, 700 bushels of oats, 700 pounds of wool, 50 tons of hay and 100 bushels of tunips. For the year the crops are estimated, much of them not having been sold at the time of the committee's visit, at the following valuation:

155 bushels of wheat, sold at \$2 40,.....	\$372 00
330 bushels of corn at \$1,.....	330 00
430 bushels of oats at 70 cents,.....	301 00
10 tons of hay at \$15,.....	150 00
665 pounds wool at 40 cents, with 30 pounds for home use,....	398 00
122 bushels potatoes at 70 cents,.....	85 40
400 bushels of apples at 65 cents,.....	260 00
Sold four horses about three years old,.....	500 00
Sold cattle stock valued at.....	500 00
Swine and pork sold and for sale, 2,500 pounds,.....	187 50
Poultry, \$50; garden produce, \$100, (family use,).....	150 00
Produce of four cows (used in family,) at \$35 each,.....	140 00
Total,.....	<u>\$3,373 90</u>

## CONSUMPTION.

The estimate of the produce of the farm consumed by the family is for an average of eight persons, but the arrangements for lumbering during the winter make it somewhat difficult to separate distinctly the actual cost of the farm from that which is applied to other outside work. Mr. Rising, however, calculates that it is about as follows:

40 bushels of wheat,.....	\$96 00	
50 bushels potatoes,.....	35 00	
Produce of the cows and dairy,.....	100 00	
1,500 pounds of pork,.....	112 00	
Fruit, \$53 25; garden produce, \$50; poultry, \$50,...	156 25	
Wool used, 40 pounds,.....	40 60	
	<u>\$540 85</u>	
Implements and repairs paid for,.....	150 00	
Wages of hired men,.....	500 00	
	<u>\$1,190 85</u>	
Net production of farm,.....	<u>\$2,183 05</u>	

On this farm the cost of operation is at the rate of \$7 per acre for each improved acre. The whole gross produce of the farm is at the rate of \$19 25, and deducting the cost of working, there remains a net produce of \$12 25 per acre.

#### CONCLUSIONS OF THE COMMITTEE.

In summing up the conclusions we have arrived at in accordance with the conditions of the examination as laid down on the premium list, we find:

1. That in "condition of surface, with regard to division into fields, the general improvement, and the system of cultivation adopted by the owner," the farms of E. L. Boyden and of Mr. Woodward are nearly equal.

2. That in the farm-house and out-buildings, so far as may be necessary in their arrangement for the accommodation of the farm, the stock and the crops, though the plans and arrangements on all three farms were radically different and in some respects equally good, yet we must observe that when the buildings on the farms of Mr. Woodward and Mr. Boyden were taken into consideration, with the nature and age of their several farms, we are unable to pronounce that either had any advantage over the other.

In drainage, there is little difference in the amount of the work done, and neither of the farms has much advantage. On the Boyden farm a considerable extent of open ditch has been

cut for the purpose of subduing the marsh, and to make an outfall for water. On Mr. Woodward's farm draining had been tried with favorable results on certain low-lying flats, from which it was necessary to conduct the water to render the land of any value. On neither farm, however, had any general, well planned system of drainage been adopted, with a view of contributing to the permanent adaptation of large tracts of land to deep culture, and the highest cultivation and production of which land is capable.

4. As to the number, breed, and quality of the live stock, it will be seen that each farm was different. On Mr. Woodward's farm, sheep was the leading stock and so far as fine wool was estimated he had the best flock. On Mr. Boyden's farm live stock was not the leading production, but his flock of sheep was adapted to the location on account of their size. In cattle and swine also, the stock of Mr. Boyden would have the preference. Neither of these farmers gave much attention to horses. Mr. Rising had made the breeding of horses a part of his business. In the adaptation and general quality of the live stock, we think Mr. Boyden had the advantage. In the adaptation of stock to the farm, there was little discrimination to be made. The following table will exhibit the economic showing of each of the farms, when considered as supporting live stock in connection with its surplus produce:

KINDS OF LIVE STOCK.	WOODWARD FARM.		BOYDEN FARM.		RISING FARM.	
	Number.	Land per head in acres.	Number.	Land per head in acres.	Number.	Land per head in acres.
Horses,.....	5	55.	7	52.	13	12.
Cattle,.....	20	14.	31	11.6	32	8.
Sheep, .....	200	0.9	400	0.9	130	1.3
Swine, .....	20	14.	26	14.7	10	17.

Estimating horses as equal to two head of cattle, five sheep as equal to one head, four swine as one head, and reducing all the stock to cattle in this proportion, we find that—

	Acres.
On the Woodward farm stock is supported at the rate of one head of cattle to each.....	2.9
On the Boyden farm at the rate of.....	2.8
On the Rising farm at the rate of.....	2.4

5. The amount and condition of the crops and the methods of tillage have been referred to in the descriptions of the farms. The orchards on neither of the farms entered into the system so as to become a principal or leading feature, which required separate consideration on the three farms. Tillage, under various conditions, was pursued as the business of the farmer.

Your committee, in reviewing the descriptions and summing up their observations and examinations, have arrived at the conclusion that while they cannot pronounce either of the farms entered as coming up to that high standard of perfection which is desirable they should be able to point out as a model, the entries are, each in its distinctive character and merits, deserving of recognition. They therefore offer the following resolutions for your adoption:

*Resolved*, That the premium on farms offered by the State Agricultural Society, be divided into first and second; that the first premium of \$60 be paid to E. L. Boyden, Esq., of Webster, Washtenaw county, and that the second premium of \$40 be paid to L. Woodward, Esq., of Rochester, Oakland county, as a testimonial of his skill manifested in the progressive improvement of a light land farm.

*Resolved*, That the medal of the Society be awarded to E. W. Rising, of Richland, as a testimonial of appreciation of his skill and ability in clearing and making productive a heavy-timbered farm.

All of which is respectfully submitted.

C. W. GREENE,  
JOHN ALLEN,

*Committee.*

R. F. JOHNSTONE, *Secretary.*

REPORT ON ORCHARDS—PREMIUM AWARDED TO JOHN STARKWEATHER,  
YPSILANTI, WASHTENAW COUNTY.

*To the President and Executive Committee of the Michigan State  
Agricultural Society:*

My apple orchard, containing about three acres of land, is situated on the south bank of the Huron river, at an elevation of 75 or 80 feet above its surface, on fractional section five, in the township of Ypsilanti. The soil is of sandy loam, similar to all sandy soils in the vicinity. The original timber growing on the soil was white and yellow oak, hickory and poplar, with some hazel underbrush. We called it oak openings. The timber was cleared off and the land broken up in July, 1841, and sown to wheat in the fall. I continued to grow wheat on the ground until the orchard was set out in the spring of 1846. I purchased of Mr. E. D. Lay, a reliable nurseryman of this place, 120 trees for this piece of ground, leaving to him the selection of early summer apples and winter fruit. Set them out 30 feet apart, at right angles. They embraced the following varieties and number of each: Ten Baldwin, eight Spitzenburg, eight Greening, eight Green Newtown Pippin, four Golden Russet, six Winter Swaar, eight Winter Pearmain, six Fall Pippin, four each of N. Y. Pippin, Twenty-Ounce Pippin, Black and Red Gilliflower, Pennock's Red Winter, Seek-no-further and Vandevere. The balance were choice summer apples of different varieties. I lost two trees the first year and two the second, which were replaced with the Northern Spy. There was wheat growing on the ground when the trees were set out. In the spring of 1846 the ground was manured with 20 loads to the acre, evenly spread, plowed and planted to corn. I had a good crop.

For the spring of 1847 the land was summer-fallowed and sown to wheat in the fall, and seeded down with clover, and remained in this condition four years, and kept most of the time for pasturing calves and colts, hay being taken off the ground but once. In the spring of 1851 it was again manured as before, plowed and planted to corn. The crop was better

than the previous one. In the spring of 1852 it was plowed and sown to oats, with no yield on account of late sowing and dry season. It was again plowed in the fall and sown to wheat and seeded down. It remained in this condition ten years, hay being taken off twice during the time. The balance of the time it was kept for pasture, as before stated, and top dressed with 20 loads of barn-yard manure to the acre, at intervals of from three to four years. It will be seen that the land was not starved. I have been amply rewarded for the labor and care in the increase of quality and quantity of fruit. The trees when set out were large, and commenced bearing fruit on the fourth year, and have steadily increased bearing up to the present time, unless an unfavorable fruit season has prevented. The cold winter of 1855-6 killed five trees: three Baldwins and two Pearmain. The latter were no great loss. One of the Baldwins sent up a shoot in the spring. I nursed it with care, and it bore fruit in 1861, but not of the right kind. In 1862 it was grafted with the Baldwin, and last fall I picked one barrel from this tree. The Baldwin does fruit best top grafted.

In the spring of 1858 I made a general slaughter on the following varieties and grafted them:

All the summer apple trees except six, Pennock's Red Winter, 20-ounce Pippin, Black and Red Gilliflower, Winter Pearmain and Vandevera. Grafts were set of the following varieties: Steele's Red Winter, Baldwin, Spitzenburg, Northern Spy, King apple and Greening. All did well except those grafted in the Winter Pearmain; they were a failure. The second trial was made with better success. It has been my practice, whenever a tree died, to remove it at once, apply a compost of muck and barnyard scrapings with the soil, and set out a good sized tree in its place. The result, in all cases, has been satisfactory.

I practice trimming the trees to suit the eye, and know of no established rule. It, however, requires experience to do it well. Trees differ—the Northern Spy is an unright grower, the limbs compact in the center until it comes into bearing, when they open and spread out until the ends touch the ground with the



weight of its beautiful red fruit. The sight is unsurpassed in the long catalogue of fruits. The pruner here is at a loss to know to which limb he will apply the fatal knife—while the *Swaar* is the antipode of his stately brother in appearance. The knife can never be used amiss.

In setting out an orchard I regard it of the highest importance to procure trees which have been grown at home—the nearer the better to where the orchard is to be set out. Soil and climate are the essential elements in growing trees, and a similarity in these important agencies should always exist between where the young trees were propagated and where they are subsequently set out in the orchard. That our soil and climate differ widely from that of the Eastern States, is a settled fact with those well versed on the subject, and so well is it understood by eastern fruit growers that they strictly adhere to the rule. We never hear of an eastern fruit grower coming after or ordering trees from the west to establish an orchard. The pomologists of Maine strongly recommend home-grown trees. The purchase of trees from abroad has taught them a dear lesson—so say their writers on the subject—and with the trees they have imported all the diseases the tree and fruit is subject to. We can grow trees in Michigan as cheap as they can, and of as good quality. But in order to do so successfully, we must patronize our nurserymen when we purchase, and where the patronage properly belongs, and thus avoid the risk of importing diseases, which, if persisted in, will prove our ruin as fruit-growers. The cultivation of fruit in our State will continue to remunerate those who are engaged in it, subject only to the disasters of the Eastern and Middle States, which we must meet and steadily combat. The great demand for it in the Northwest is steadily on the increase, and facilities afforded for its transportation at different points keep pace with the demand; hence there can be no danger of an over supply; besides, recent indications point out calls for it in other directions. In the Eastern and Middle States, places once renowned for the splendor and extent of their fruit orchards, in many localities

at the present time, are little better than a barren waste, and one is led to doubt his senses when viewing the scenes of desolation which surround him. Those who have reset their orchards with young trees are discouraged in their constant, but vain, efforts to head off the deadly enemy. Toil and care meets with no favorable return, but, on the contrary, not one tree in ten escapes the destructive ravages of the caterpillar, borer and blight, which remind him of labor lost. Scarcely an eastern agricultural paper comes to hand that does not contain complaints, causes and remedies for the decline of the apple orchards, and now that they begin to appreciate the want and worth of this most excellent fruit, its praises are told in story and sung in song. The tree known in their youth to bear the favorite apples is gone, and the pang of regret is visible in the countenances of those who rehearse the tale. Such being the condition of fruit growers in other sections of the country, it stands us in hand here to be vigilant and do our part well in this branch of industry.

I think top dressing with barnyard manure the only reliable course in keeping up the proper standard of fertility to produce a crop of fruit of good quality. The less the ground is plowed after the trees are matured the better for them. Young fibrous roots run in every direction, and approach the surface of the ground in search of food, which the plow destroys. This orchard was plowed three years ago last spring, turning under the usual amount of manure, and sown to oats, which were left on the ground, never maturing. It was painful to hear the plow scour the numerous small roots, and I resolved never to do it again. My fruit has been frequently on exhibition at our fairs, both State and County, and has been awarded premiums in every instance. My orchard is the jewel of my farm—out of doors.

JOHN STARKWEATHER.

## REPORT OF THE COMMITTEE ON VINEYARDS.

*To the President and Executive Committee of the Michigan State Agricultural Society:*

The special committee to whom was referred the examination of vineyards in this State, in company with exhibitors and other amateur culturists, concluded on the 6th day of September last, a personal and thorough examination of all the vineyards and nurseries entered for premiums, and as the result of the examination, report:

The small number of entries seems to indicate but little interest in our State, in this important branch of horticulture. These entries were all within the Lake towns of Monroe county, and in localities where the soil is similar, if not fully equal to that of the Islands of Lake Erie.

The grape culture, though scarcely more than commenced in this county, is rapidly increasing, and promises to be richly remunerative to those who properly engage in it. In soil and climate, the county of Monroe, and especially the Lake towns, are admirably adapted to the growth and perfection of certain varieties of the grape, and the wonder is that the enterprise of Monroe farmers has not before been turned in this direction.

The county is indebted for what there is of grape growing interest there, to its enterprising citizen, Hon. J. M. Sterling, who first introduced its field culture; and he was induced to try the experiment by the similarity of the soil to that on the Island, with which soil, and with the grape culture there he had been for years familiar. Others have followed his example until grape culture no longer remains an experiment in old Monroe, watered and drained by its Raisin River. Over fifty acres of fine, young vineyards have been set, and we are told there is a prospect of double that amount being set during the coming year.

It was difficult for the committee to decide upon the relative merits of the several vineyards visited by them in their examination. All were creditable and clean; in general, regularly and properly set, well pruned and staked or wired.

The committee award to Mr. Sterling the first premium, more on account of the age of the vineyard and the fall show of fruit, than in consideration of any superior culture or advantage of soil or location. He has nearly five acres on a rich clay loam, underlaid at about three feet with lime-rock, or indurated clay, well tile-drained, fenced, and neatly trained on wire trellises. About half an acre of this was in heavy fruiting, exceeding any we have seen upon the Islands, or elsewhere in this State. The balance of the vineyard consisted of young vines, too young to bear, but very strong and healthy.

Adjoining the vineyard of Mr. Sterling, is that of Harry and Frank Clarke. It contains about five acres, handsomely set with young vines, too young for training, and consequently not trellised. These grounds were in fine order, well drained, and the vines vigorous and strong, promising to be a first class vineyard, and to be highly remunerative to its owners.

Mr. Joseph Sedlaezek's vineyard of about four acres, lies within the city, on a variety of soils—part on sand, slightly mixed with clay, part on a clay loam, and part on clay underlaid with lime-rock, thoroughly and scientifically tile-drained. His bearing vines, less than half an acre, are on sand, in fine condition and very productive, but rather too close together. The balance of his grounds were better laid out, and the young vines vigorous and healthy. He will doubtless make a fine show of grapes in a year or two.

Mr. John Reisig, a gentleman of experience in grape growing, and enthusiastic upon the subject, has a vineyard of nearly three acres, lying partly in the city and partly in the town of Monroe, on sandy loam, and clay on lime-rock, or indurated clay. His vines are young, mostly of one or two years growth. He has some bearing vines trained to stakes, which were well fruited. This vineyard is thrifty, neat, and well cultivated; a fine specimen of stake and field culture.

Mr. Martin Deistler has about three acres near and partly adjoining the vineyard of Mr. Reisig, and is very similar in ap-

pearance and culture, and same in soil; well drained, and in a high state of cultivation; a promising young vineyard.

Messrs. Deiderich & Breisach, wine merchants in Detroit, have a vineyard of nearly eight acres, lying near and on the same slope of land with Mr. Reisig's. The soil is a sandy loam and clay on an underlay of lime-rock, in parts very similar to the Kelley Island soil. These enterprising gentleman have made valuable improvements on their piece of land,—well set with thrifty and strong vines. It is well cultivated, and creditable to its proprietors, as the beginning of a productive and valuable vineyard.

Passing from the city and town of Monroe, we next visited the farm of Mr. Geo. Hurd, on Sandy Creek, in the town of Frenchtown. Mr. Hurd has a vineyard and nursery of about eight acres, half an acre of which is in full bearing. While his entire vineyard was remarkably clean, and his vines healthy and strong, this half acre in fruit attracted particular attention and called forth remarks of surprise and admiration, at the beauty and abundance of its clusters. The soil, on first sight, seemed pure sand, but on close examination proved to be mixed with small pellets of indurated clay, resembling coarse gravel, which, from exposure to air, sun and frost, had decomposed, and had the appearance of gray lime. To this element in the soil is credited the abundant crop of fruit, and the strong and healthy vines. Between this and Mr. Sterling's vineyard, it was difficult to say which was the best; yet the committee concluded to award to Mr. Hurd the second premium, and to commend his vineyard and grounds to the inspection of all lovers of vine culture.

The vineyard of Col. B. H. Campbell, on his farm, about half a mile from Mr. Hurd's, was next visited. He has about eight acres, set last spring, on clay loam. The plants look healthy and promising, the strong, vigorous shoots indicating soil well suited to the grape. The Colonel is enthusiastic on this subject, and promises to outdo all other vineyards in the county—and he generally does what he promises.

Leaving the Colonel's plantation, we drove to the great point of attraction, Pt. de Peau, owned by Messrs. Ives, Williams, Sterling & Noble. This beautiful spot, embracing about thirty acres on the lake shore, is a choice piece of land, of the same composition of the islands of our lake, so justly famed of late years as growing the best grapes in the United States. It is being set with grapes, and it is believed by those competent to judge, that for grape-growing, it is equal in soil and climate to either Put-in-Bay or Kelley's Island.

These enterprising proprietors have laid out this tract for a vineyard and summer resort for themselves, families and friends. They have about eight acres out in grapes just coming into bearing, and at present the vines look as healthy and vigorous as any that can be found on the celebrated grape-growing islands. The committee have given this vineyard the third place in their awards, but with an opinion that, from its location and soil, it will, when in bearing, equal any that can be found in Michigan or Ohio.

The Delaware and Concord are the favorite varieties cultivated in Monroe county, giving the preference to the Delaware as the finest, but to the Concord for common culture for the million, as being very hardy and productive. Either of the varieties will mature fully in the southern and central portions of our State, and perhaps throughout the entire Southern Peninsula.

In setting out their vineyards, the proprietors have taken pains to obtain the best of stock, true to name, and are now propagating extensively from these vines for future setting. They deem the stock propagated in our own climate and soil, better adapted to vineyards in Michigan, than stock grown east or south. We notice in most of the vineyards large nurseries, exceedingly thrifty, grown from their own vines in open air, and more valuable for vineyard-setting than those propagated in hot houses.

The committee believe that the success of grape culture in the southern half of Michigan is no longer problematical, and

that more capital, and greater interest and intelligent industry in this branch of agriculture, will bring abundant reward to the proprietors, and advance the interests of our State.

K. C. BARKER,  
F. WALDORF,  
J. R. GROSVENOR,

*Committee.*

September 10th, 1867.

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REPORT ON FRESCOE PAINTING.

*To the President and Executive Committee of the Michigan State Agricultural Society:*

The undersigned, your committee appointed to determine and report upon the merits of certain fresco painting entered for a prize at the late State Fair held in this city, respectfully submit the following:

The different specimens entered for competition and viewed by your committee, are as follows: By Wm. Wright & Co., a design for a ceiling in fresco, which was exhibited at the fair grounds, the vestibule and office ceilings of the Biddle House, and the ceiling of M. S. Smith's jewelry store. By Dean, Brow & Co., the ceilings of the vestibule and dining hall of the Russell House.

Your committee take great pleasure in expressing their admiration for each of these works, and feel proud that our city has artists of skill and talent equal to their production. The three specimens first mentioned, namely: the design, the ceiling at the Biddle House, and at M. S. Smith's store, are by Messrs. Rusca & Negra, of Wm. Wright & Co. The ceilings of the Russell House are by Robert Hopkins, Esq., of Dean, Brow & Co. This frescoing, especially the dining hall, which has a ceiling measuring about 100 feet by 40 feet, is both in design and execution entitled to especial praise, and does great credit to the artist. The arabesque paneling on either side of

the dome, and the mouldings surrounding the whole room are admirably produced, the relief being almost perfect; the effect of the dome itself seems somewhat marred by the raised and highly ornamental center piece from which is suspended the chandelier. This mechanical difficulty, your committee are well aware, could not be controlled by the artist. The balustrade and figure painting at the base of the dome, though shown in a difficult perspective, is very successfully handled. The execution of the whole of this work is so admirable that your committee feel constrained, though not properly within the scope of their report, to express the hope that Mr. Hopkins may, ere long, be enabled to enjoy the advantages of foreign travel for the purpose of studying the best works of the masters of this art in the public buildings and academies of the old world; he owes this to himself, and to the fine talent of which he is possessed.

Of the design first above referred to, and entered by Wm. Wright & Co., your committee have nothing but commendation to offer. In coloring, taste and execution, it is a fine specimen of the art, and is exceedingly creditable to the artists, Messrs. Rusca and Negra, as is also the frescoing at the Biddle House, and at Mr. Smith's store. The execution of both of these works in all their details, is sharp, clear, and beautifully colored. The harmony of coloring is especially noticeable. It is difficult to particularize the merit where all parts are good, yet perhaps the marble paneling and medallion work stand first in excellence.

The lowness of the ceilings both here and at the store of M. S. Smith & Co., is a disadvantage under which the artists have labored, and which renders the perspective less effective than it would be otherwise, and has also precluded that boldness of design and execution which characterize the frescoing of the dining hall of the Russell House, where the height of the ceiling gives a much better opportunity for the artist to display his work, an opportunity of which Mr. Hopkins has taken full advantage, and has met the difficulty of harmonizing a



variety of colors in a bold and strikingly beautiful design with unusual success.

The very marked difference in the character of the two classes of frescoing, owing to the difference in the size and height of the ceilings, renders your committee very reluctant to pass upon the relative merits of the work. Each is so fit for its own position, and would so illy bear transposition, that a comparison of merits is difficult, and would seem to entitle each to preference over the other for certain classes of excellence.

In view of the above, your committee are unwilling officially to pass a judgment assigning a prize to one of these works rather than the other, lest by so doing they should exercise an authority not warranted by their knowledge of the subject matter in question, and thereby do injustice to some of the very talented gentlemen whose work is submitted to their judgment.

R. W. KING,  
LEW. T. IVES,  
B. VERNOR,  
J. M. STANLEY,  
*Committee.*

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## PROCEEDINGS OF THE EXECUTIVE COMMITTEE OF THE STATE AGRICULTURAL SOCIETY,

AT THE ANNUAL MEETING HELD AT DETROIT, FEBRUARY 4, 1868.

In pursuance of notice ordered by the President, the Executive Committee of the Michigan State Agricultural Society met at the Russell House, Detroit, on the morning of Tuesday, February 4th, 1868. Present: W. G. Beckwith, President; E. O. Humphrey, Treasurer; J. A. Walter, Kalamazoo, W. J. Baxter, Jonesville, William Adair, Detroit, M. Miles, Lansing, L. S. Scranton, Grand Rapids, John Gilbert, Ypsilanti, John Allen, Plymouth, C. W. Greene, Farmington, W. S. Willcox, Adrian, J. M. Sterling, Monroe, A. C. Fisk, Coldwater, and R. F. Johnstone, Secretary.

The Committee being called to order by the Chair, the President made the following address:

ADDRESS OF THE PRESIDENT.

*Gentlemen of the Executive Committee:*

During the year that has just closed, our people, under the protecting care of Providence, have enjoyed a remarkable degree of health through all our borders. At the same time, and under the guidance of that same beneficent ruler, unusual prosperity has followed the skill and labor of the husbandman. Grateful we should be for these inestimable blessings, remembering also that duty calls upon us to relax no effort on our part to ensure a continuance of them during the year upon which we have entered.

The State Agricultural Society which you represent, and which, to a certain extent, is looked upon as the guardian of the agricultural interest of Michigan in a financial point of view, presents a gratifying state of affairs.

The Society has now assets to the value of over \$20,000; of these, \$4,000 is cash in the hands of the Treasurer. Thirteen thousand dollars are invested in the buildings erected last year, and \$3,250 in the museum building at Ypsilanti. The receipts and expenditures are larger for the past year than they have ever been, and indicate the magnitude of the interests with which the Society is now connected.

The manufacturing interest of Michigan has already assumed an importance second to no other interest in the State, and in my opinion our people have not too early given this subject their attention. The people of the entire West have too long been contributing to New England and the East generally, for products of manufacturing skill and labor. Possessing as we do, almost every element necessary to a successful competition with the manufacturers East, it is high time we assert and maintain our true position.

In view of the importance of this great interest, I would most earnestly recommend that you take such action in regard

to premiums for manufactured articles as you may deem best calculated to bring out the largest number for exhibition, as well as provide capacious and suitable buildings for their display.

It will be your duty to make such disposition of the money on hand as you may deem it most for the interest of those branches of industry the Society was designed to foster.

On occasions similar to this, I have expressed the opinion that good policy forbids the idea of accumulating and keeping on hand a greater amount than was necessary to meet the prospective demand of the Society for the current year.

I am still of the same opinion; I would therefore recommend that the greater portion of the funds on hand be used to increase the amount offered as premiums. In this connection I would call your attention to those agricultural implements which enter into most common use among our farmers, such as plows, cultivators, drills, and all other farm implements and machinery which save time and labor.

In all cases I would subject the implement or machine offered for a premium to a thorough and complete trial before a competent committee, leaving it to approve or condemn, to point out defects, or suggest the alteration and improvements that might make it a desirable article for farmers. My views upon the various breeds of cattle, sheep and swine, and their management, have been so often stated in your presence during the four years I have had the honor to preside over your deliberations, that I deem it unnecessary to repeat them at this time. Besides your own good judgment should guide you rather than any views I may entertain upon the subject.

My opinion upon horse-racing at State and County fairs has undergone no change since I last gave my views upon the subject. On the contrary, I am more strongly impressed than ever that much harm results to our annual exhibitions when racing is encouraged. Nor can I see any good resulting from the adoption of any English customs which are not backed up by the moral sentiment of our people, such, for example, as hurdle

racings, or running horses through board fences. I have no doubt of the superiority of the thorough-bred horse, and would encourage their more general introduction among breeders; yet I do not see the necessity of a jockey race at a State Fair to show their action or test their power of endurance.

I would suggest, in regard to the classes of carriage and gentlemen's driving horses, that a rule be adopted requiring the owners themselves, in all cases, to drive and manage their own horses when competing for a premium; in other words, exclude professional jockeys and horse trainers from taking charge of and managing this class of horses when on trial, and contending for prizes at our State Fair.

One means of largely increasing the premium list and consequently the interest in our annual exhibitions, might be attained by permanently locating the place for holding our fairs, thus cutting off the large annual expense incurred from year to year by the erection of buildings.

I hope you will consider the matter and take such action as will result in the greatest good to the society at large.

Efforts have been made by your committee to get up a more general and decided interest among the farmers of Michigan upon the subject of stock-raising and farming generally, by means of conventions, clubs, associations, etc. But their efforts have not been attended with the success we could desire and have a right to expect.

Of late I have been more than usually impressed with the thought that our farmers, when brought together, either by accident or design, are more silent on matters relating to their calling than are merchants or any other class of people. Why this is so I am unable to determine. Upon matters and things in general, and politics in particular, they seem communicative and intelligent. But if you wish to learn your neighbor's mode of putting in a crop, or how he manages his stock through the season, too often you must resort to an ingenious system of cross questioning in order to get at the fact. This should not

be, believing the farming occupation to be the most important and honorable of any.

They should be free to communicate, ready to instruct and willing to learn. By counsel with each other, and learning the different modes practiced in doing the same thing, much valuable knowledge may be gained for individual and general use. If our boys were early provided with some respectable agricultural paper instead of the cheap sensational literature: if the fathers themselves would become more conversant with written upon the management of stock, the dairy, orchards and gardens, then with those cheap political scribbles that infect our country, we would have a more able, vigorous and self-relying body of farmers, and a more progressive system of agriculture. Farmers' clubs in school districts and farmers' associations in towns ought to be formed all over our State.

The long winter evenings could be very profitably spent in such organizations, and great good in the end would result to agriculture from them. I leave it to you to devise what action on your part is needed to stimulate our farmers to action in the direction I have mentioned.

The Secretary submitted his annual report which was read as follows:

#### REPORT OF THE SECRETARY.

To the President and Executive Committee of the Mich. State Agt. Society:

The Secretary submits the following report as a statement of the business of the Michigan State Agricultural Society for the year ending Dec. 31, 1887:

At the close of the report for the year ending December 31, 1886, there remained on hand the following amounts, invested and uninvested, after all accounts and expenses had been paid that were entitled and presented up to that date:

Invested in U. S. 5-20 bonds, .....	
Invested in U. S. 7-30 bonds, .....	\$21,000 00
Share funds of member at Adrian, .....	2,000 00
Building Fund of Kalamazoo, .....	2,000 00
Cash balance in hands of Treasurer, .....	2,000 00
<hr/> Total available funds, January 1, 1887, .....	<hr/> \$27,000 00

During the year there has been received from the various sources named, the following amounts, viz:

From interest on bonds,.....	\$ 228 00
“ sale of tickets at Fair Grounds, .....	10,487 00
“ rents received by J. A. Walter, .....	60 50
“ S. B. Wakefield, for lumber, .....	3 00
	<u>\$11,308 50</u>
Total amount of Detroit Subscription Fund,.....	\$9,050 00
Uncollectable and deducted, .....	965 00
Total (See list C),.....	<u>\$8,085 00</u>
From Railroad Subscriptions (See list C), .....	1,323 87
“ leases of grounds for restaurants, &c. (See list E),.....	1,691 00
“ entries for citizens' premiums (See list F),.....	845 00
“ membership tickets,.....	410 75
“ rent of buildings, .....	100 00
“ premiums returned,.....	110 70
Total received by Secretary and paid to Treasurer,.....	<u>12,575 32</u>
Total receipts for the year,.....	<u>\$23,775 82</u>
Total funds of the Society for the year, .....	<u><u>\$35,846 36</u></u>

The expenditures during the year have been as follows, viz:

Drawback allowed for error in sale of lumber on notes of J. Berry,.....	\$1,200 00
Premium checks issued for awards made in 1866 (See List B),.....	135 00
“ “ “ “ 1867 (See List B),.....	7,005 80
Business checks issued for construction of buildings, dock, and other fixtures now on Fair grounds (See List A),.....	13,407 24
Business checks for general expenses of the Society and of the Annual Exhibition of 1867 (See List A),.....	6,497 82
Paid for collection of Detroit subscription,.....	250 00
	<u>\$28,575 86</u>

The Society has now on hand, January 1, 1868:

U. S. bonds, 5-20's,.....	\$3,000 00
Invested in Museum, . . . . .	2,350 00
Balance in Treasurer's hands,.....	1,020 80
	<u>7,370 80</u>
	<u><u>\$35,846 36</u></u>

The total assets of the Society, at the close of the year, are therefore as follows:

Total invested and uninvested funds remaining on hand,.....	\$7,370 80
Buildings and fixtures now on Fair Grounds, valued at their actual cost, .....	13,407 24
Total means of the Society, January 1st, 1868,.....	<u><u>\$20,678 04</u></u>

The details of the general business expenses of the Society have been classified in the following tables with the design of presenting to the Executive Committee in a brief and clear form the particulars and amount of each class of expenditures. The particulars of each payment, with the name of the party to whom paid will be found on the list of business checks drawn for the year, marked "Schedule A," and the complete list of the premium checks issued, will be found marked "Schedule B:"

1. Paid on account of expenses of 1866, ...	\$ 97 80
2. Winter meeting of the Society, 1867,.....	300 56

2. Construction and lumber for Fair buildings:	
Cost of dock for landing, .....	\$ 903 89
Cost of lumber and building, as per contract, .....	11,638 43
Cost of fitting up Mechanics' Hall, with cost of shelling and general miscellaneous items, .....	500 93
Cost of walls and brick for the same, .....	367 00
	<u>\$12,040 25</u>
4. Postage and Revenue stamps, .....	213 80
5. Rents of grounds and office, .....	550 00
6. Decorations and preparation of grounds, .....	552 12
7. Expenses of superintendents, gate-keepers, marshals, watchmen, refresh- ments, and other items, .....	761 06
8. Straw and hay, .....	344 10
9. Music, .....	240 00
10. Water expenses, .....	272 00
11. Assistant Secretaries, .....	278 50
12. Advertising, .....	142 05
13. Printing premium lists for 1867, .....	225 00
14. Printing large bills, .....	250 00
15. Printing Treasurer's tickets, .....	79 00
16. Small bills, miscellaneous printing, etc., .....	453 42
17. Bill posting, .....	100 20
18. Stationery, .....	39 25
19. Business Committee expenses, .....	181 90
20. Premium medals and diplomas, .....	451 18
21. Express and telegraph, .....	16 70
22. Expenses of Farm Committee, .....	30 25
23. Salary of the Secretary, .....	800 00
24. Expenses of Treasurer, .....	310 75
	<u><u>\$12,904 06</u></u>

The premiums awarded and issued for the year 1867, were as follows, viz:

#### DIVISION A—CATTLE.

Class.	
1. Short-horns, .....	\$372 00
2. Devons, .....	355 00
3. Herefords, .....	220 00
4. Herds, .....	200 00
7. Grades, .....	25 00
8. Working-Cattle, .....	48 00
9. Fat Cattle, .....	120 00
	<u>\$1,240 00</u>

#### DIVISION B—HORSES.

10. Thoroughbreds, .....	\$187 00
11. Part thoroughbreds, .....	149 00
12. Horses of all work, .....	223 00
13. Roadsters and trotting horses, .....	447 00
14. Draught horses, .....	91 00
15. Stables of colts, .....	50 00
16. Carriage and buggy horses, .....	82 00
17. Matched and cavalry horses, .....	106 00
18. Jacks and mules, .....	84 00
	<u>1,433 00</u>

## DIVISION C—SHEEP, SWINE AND POULTRY.

## Class

19. Spanish Merinos,.....	\$177 00	
20. Michigan Fine-Wools, .....	26 00	
21. South Downs,.....	97 03	
22. Leicesters, Cotswolds, &c.,.....	106 00	
23. Fat sheep,.....	16 00	
24. Swine,.....	106 00	
25. Poultry, .....	21 00	
		<b>\$548 00</b>

## DIVISION D—FARM IMPLEMENTS AND MACHINERY.

27. Plows, harrows, seed-drills, etc.,.....	\$ 83 03	
28. Haying and harvesting implements,.....	9 00	
29. Threshing and cleaning machines, .....	60 00	
30. Wagons and carriages, .....	124 00	
31. Barnyard articles,.....	55 00	
32. Dairy and household articles,.....	10 00	
33. Stoves and hollow-ware, .....	113 00	
		<b>464 00</b>

## DIVISION E—FIELD AND GARDEN PRODUCTS.

34. Grain, flour, seeds, etc.,.....	\$ 5 00	
35. Vegetables, .....	25 00	
		<b>30 00</b>

## DIVISION F—DAIRY AND HOUSEHOLD MANUFACTURES.

36. Butter and cheese, .....	\$34 00	
37. Sugar, honey and bee-hives, .....	23 00	
38. Bread, preserves and pickles,.....	21 00	
39. Wines, vinegars and cordials,.....	19 00	
		<b>97 00</b>

## DIVISION G—DOMESTIC MANUFACTURES.

40. Home-made, .....	\$45 00	
42. Articles of dress,.....	8 00	
43. Leather and India rubber,.....	27 00	
44. Furniture, .....	24 00	
45. Ornamental Iron work,.....	5 00	
		<b>109 00</b>

## DIVISION H—FINE ARTS, ETC.

46. Paintings, &c.,.....	\$41 00	
47. Musical instruments, .....	87 00	
49. Clocks and jewelry,.....	17 00	
50. Needle, wax and other fancy work,.....	24 00	
		<b>169 00</b>

## DIVISION I—FLOWERS AND FRUITS.

51. Flowers, professional, .....	\$62 00	
52. Flowers, amateur, .....	3 00	
53. Collections of fruits,.....	175 00	
55. Apples, amateur,.....	54 00	
56. Pears, amateur, .....	19 00	
57. Peaches, plums, &c.,.....	28 00	



## Class.

58. Apples, professional,.....	\$58 00	
59. Pears, professional,.....	34 00	
61. Grapes, native and foreign,.....	21 00	
		<u>\$447 00</u>

## DIVISION K—MISCELLANEOUS.

62. Miscellaneous, models, &c.,.....	\$11 00	
Premium of 1866,.....	8 00	
		<u>19 00</u>
		<u>\$7,095 50</u>

In addition to the above premiums there are to be charged to premium account the following, which are included in the business checks above, viz:

To Medals awarded,.....	\$302 50
To Diplomas awarded,.....	62 75
	<u>\$365 25</u>

The following table exhibits the number of entries made in each of the several divisions for the past nine years:

## ENTRIES MADE BY EXHIBITORS FOR THE PAST NINE YEARS.

	1859	1860	1861	1862	1863	1864	1865	1866	1867
Cattle,.....	255	133	198	189	165	66	86	140	132
Horses,.....	342	274	217	185	252	227	260	263	200
Sheep, swine and poultry,...	225	162	151	121	200	200	218	174	187
Implements,.....	221	166	180	173	208	207	239	227	479
Seeds and vegetables,.....	84	54	51	29	14	189	117	181	72
Dairy & household products,	94	87	107	67	78	149	122	156	119
Manufactures,.....	342	303	220	161	133	108	97	78	152
Fine arts,.....	194	170	104	128	167	197	278	232	223
Flowers and fruits,.....	515	338	222	281	256	75	231	303	160
Miscellaneous,.....	63	44	79	25	21	59	72	87	277
Crops, farms, orchards, etc.,	5	....	3	8	1	2	18	14	16
	<u>2340</u>	<u>1728</u>	<u>1538</u>	<u>1262</u>	<u>1485</u>	<u>1429</u>	<u>1797</u>	<u>1825</u>	<u>2196</u>

By reference to the report of last year, it will be seen that the total assets of the Society were, at the close of 1866, really \$10,971 00, after deducting the draw-back allowed on the price of the lumber of the buildings sold at Adrian. With the close of the present year the assets of the Society are \$20,678 04, of which \$4,020 are cash items.

After an absence of four years, during which the annual exhibition was held for two years with marked success at Kalamazoo, in the western part of the State, and two years with equal satisfaction to the agricultural, mechanical and manufacturing interests, in the southern section, at Adrian, the citizens of Detroit competed with great liberality in their proposals for the location near their city. The subscriptions, it will be seen, realized to the Society \$9,417 87, a sum that enabled the Executive Committee to erect the most extensive and best arranged series of buildings for the accommodation of its officers, exhibitors and visitors, that has yet been seen in the State, and which have been pronounced by competent judges, to have excelled in their accommodations even those of New York, Ohio and Illinois. The subscriptions, it will be noted, did not entirely meet the whole construction account, as the original cost reached \$13,407 24, showing that the expenditures of the Society, in addition to the subscription, for construction, were nearly \$4,000.

The annual exhibition itself was, in general, eminently satisfactory. The number of entries were larger than they have been in the aggregate since 1859. Several of the divisions, as will be seen by reference to the above table, were not so full as the Society had a right to expect, but there were more exhibitors from abroad than have been at any fair held, and the Canadian Dominion especially favored the Society with a large number of entries, encouraged by the liberal measures which the Secretary of the Treasury permitted the Collector at this Port to adopt, and which were carried out very successfully, without any loss to the public treasury, at little expense to the Society, and but slight inconvenience to the exhibitors who came from the Dominion. In Cattle, the exhibition hardly did full justice to our State. In Horses, there was the finest gathering that has yet been seen, especially when we have reference to quality and numbers. In Sheep, the long-wools took the precedence of fine-wools for the first time in the history of the State. For this we are indebted somewhat to the exhibitors from Canada.

The amount of the premiums paid to South-down and long-wooled sheep being \$203 against \$203 to the fine-wool classes, although the premiums for fine-wools are rather the largest. In fact, the wants of manufacturers, the high price obtained for long wool, and the active demand for it, with the over-productions of merino wool in every State and Country, raises the proposition whether the Society itself should not give greater encouragement than it has yet done to the introduction and breeding of the higher and more valuable breeds of long-wools. The long, fine, glossy wool of the high-bred Leicester, is scarce in every market of the world, and its production here would give encouragement to the introduction of the manufacture of fabrics in our own State and country for which we are now mainly dependent on our imports. In the classes of implements and machinery, and in the miscellaneous class, the entries were far beyond any precedent which we have ever had, and it is believed that these Divisions, which promise to become even more prominent in the future than they were in 1867, should have a thorough revision, and an increase in the value of the premiums offered. The extraordinary drought which had parched the soil allotted for the trial of implements, prevented last year the tests which were so eagerly looked for, but the postponement will render the trials of 1868 peculiarly important, and they will be largely attended. Though the encouragement given to the division of fruits is liberal, yet last season, either through failure of the crop, or some other cause, the entries were only half as great in numbers as they were at Adrian in 1866. Every accommodation was afforded by devoting to this department a large and roomy hall.

Grape-growing in some sections of the State has lately become an important interest, and the entries of vineyards of two acres or more in size were quite remarkable. The committee appointed to view and decide on the most meritorious, have forwarded to me a report, which I take great pleasure in submitting, as an indication of the successful development of a new addition to the products of the State. Though the entries

were all from the section lying on the borders of Lake Erie, I would call attention to the fact that on the borders of Lake Michigan, along the Lake from St. Joseph as far north as Muskegon, very important improvements have been made, and a number of vineyards have been planted within the past two or three years. At Spring Lake, in Ottawa County, there are enumerated 33 vineyards, containing 29,907 vines.

The entries of farms for the farm premium offered was responded to by entries of three, on which the committee appointed by the President have made a report, which is herewith submitted. As a means of exciting inquiry and investigation relative to the improvement of land, this class of premiums is of the utmost importance. It is now becoming an important question whether the State Agricultural Society is really promoting all the objects of its foundation by confining its efforts to the interests developed by the Annual Fair only. The agriculture of the State is not so progressive as it is generally supposed to be. The increased production of the crops on which we depend for a surplus comes more from the addition of new lands to our arable area than from an increased produce per acre caused by high and perfect systems of cultivation. There are in this State altogether about five and a half millions of acres of lands that are called improved, or has been rendered adapted to the use of the farmer in some way. Of this, five millions of acres lie south of the north line of Kent county, and of these at least one-fourth are used annually for the production of wheat. The whole production of wheat by the State last year cannot be placed at over eleven millions of bushels, which includes all that the people of the State depend upon for seed, for home use, and for export. This is actually at the average rate of eleven bushels per acre. Were it fifteen, it would not be extraordinary; yet, if our average production were at all equal to what it should be, we should have eleven millions of bushels of wheat for export, instead of six millions, which is all we can count upon now, even in a favorable year. We have increased very largely in the production of wool, but it is now

a question whether it has not been at the expense of a large decrease in neat stock, which has not been taken into the estimate of profit and loss. Where the attention of the farming community has been addressed almost entirely to the improvement and cultivation of the surface, it has become evident that the improvement and amelioration of both surface and subsoil must hereafter become a necessary part of the business of the farmer. And the question is suggested: Is it not the duty of this Society to devise means and ways by which it can promote a more thorough and perfect system of treatment of land than now prevails? The premiums on farms have already done something in this direction, and the example of the State has been followed with remarkable success by some of the County Societies. In my last annual report, in referring to the premiums on farms, the following suggestion occurs:

"It may be well, however, to consider whether, in this State, it may not be proper to adopt a system of classification which would stimulate improvement in new settlements, by offering premiums which would be so arranged as to permit farms in new and little improved localities to compete only with each other, and not with the farms in older sections where improvements by the use of labor, capital and time, have given advantages which cannot be within the reach of new settlers."

The experience of the past year, and the examination of farms entered in 1867, confirms the propriety of this suggestion, and I would again call your attention to it.

Another means of awakening a more thorough interest in the necessity of an improved system of culture, is by holding Conventions, at which the farmers of the State may consult together, on what measures should be adopted and recommended as best fitted to render our agriculture progressive. Last year the State Convention, held under the auspices of the State Agricultural Society, at Ann Arbor, was remarkable for the interest it created, and was very generally attended. The Convention seems to be the great moving power of the times, in religion, in politics, in manufactures; and in all measures of

change and reform, the Convention is made use of with success. Why not in agriculture? an interest that yields to none in importance. At the Convention held last year, a committee was appointed on the part of the Convention to confer and advise with the executive committee at its annual meeting, on this subject.

The President of the Michigan Sugar-Growing Association has notified me that the annual meeting and Convention of that society will be held on the 18th of February, at Sturgis. Last year this meeting was held at Tecumseh, and the year previous at Flint. These Conventions have heretofore been pronounced the best and most thorough meetings of the kind held in the United States, and much of their success has been owing to the influence which the State Society has given them by the liberality of its action in the distribution of its premiums.

The plate and design for the diploma of the Society has been used ever since its organization, and considering that the period in nearly twenty years, a change seems necessary. It would seem proper, also, that a Society which desired to make known its appreciation and encouragement of the progress of art, should manifest it in the testimonials it distributes, and keep pace with the public taste. It is suggested that a premium should be offered for the best and most appropriate design for the diploma. Such design, whilst emblematical of the character of the Society, should itself be an object of some value for its display of artistic skill, and should be so striking in its effect as to attract attention, as the diploma is used as a desirable means of directing the public to the merits of the articles to which it has been awarded.

Respectfully submitted.

R. F. JOHNSTONE.

## TREASURER'S REPORT.

*To the Executive Committee of the Michigan State Ag'l Society:*

MR. PRESIDENT: I herewith submit the annual report of the business transactions of the Treasurer's office for the fiscal year ending December 31, 1867, viz:

## RECEIPTS.

Cash on hand January 1, 1867,.....	\$393 37	
From collections of James Berry's notes, .....	1,725 00	
From sale of 10-40 bonds, .....	2,000 00	
Bonds on hand, 5-20's, U. S.,.....	3,000 00	
Total amount in my hands January 1, 1867,.....		\$7,617 37
From sale of tickets at Fair,.....	\$19,847 17	
From J. A. Walter, at Detroit,.....	63 50	
From S. B. Wakefield, for lumber, .....	3 00	
From interest on bonds, .....	203 00	
From R. F. Johnstone, Secretary,.....	12,285 35	
		<u>23,498 52</u>
Total receipts for the year,.....		<u>\$21,106 80</u>

## DISBURSEMENTS.

For business checks of 1866,.....	\$ 90 75	
" " 1867,.....	19,713 73	
For premium checks, 1866,.....	500 00	
" " 1867,.....	6,062 00	
Total checks paid,.....		\$27,062 48
Cash on hand,.....		1,054 41
Bonds on hand,.....		2,000 00
		<u>\$21,106 80</u>

R. O. HUMPHREY,  
Treasurer.

On motion of Mr. Baxter, the President's address and the report of the Secretary were referred to a special committee, that the subjects referred to may be referred to appropriate committees for consideration.

The Chair appointed Mr. Baxter, Mr. Humphrey and Mr. Miles as such committee.

The Chair then appointed the following standing committees:

*On Finance*—Mr. Baxter, Mr. Allen and Mr. Gilbert.

*On Rules and Regulations*—Mr. Walter, Mr. Miles and Mr.

**Fisk.**

*On Premium List*—Mr. Willcox, Mr. Greene, Mr. Allen, Mr. Adair and Secretary. †

*On Conventions*—Mr. Greene, Mr. Miles and Mr. Scranton.

*On Museum*—Mr. Baxter, Mr. Gilbert and Mr. Adair.

Mr. Baxter, from the committee on the reference of the subjects recommended in the address of the President, and the report of the Secretary, to various committees, report that they be referred as follows, viz:

1st. That so much of said report as refers to manufactured articles and premiums to be offered for them, be referred to the committee on the premium list.

2d. That so much as refers to implements and their trials, be referred to a special committee on implements and trials, with instructions to report to this committee some plan for adoption to secure the trials proposed.

3d. That so much as refers to trials of speed in classes of horses, be referred to a special committee of three, with instructions to report a plan of action, for adoption.

4th. That so much as refers to the driving of carriage horses and horses in harness by exhibitors only, be referred to the committee on rules and regulations.

5th. That so much as refers to premiums on long-wooled sheep, be referred to the committee on the premium list.

6th. That so much as refers to the museum, be referred to the committee on the museum.

7th. That so much as refers to vineyards, field crops, wheat crops, &c., and premiums on farms, be referred to the committee on the premium list.

8th. That so much as refers to the permanent location of the State Fair at some one or more points, be referred to a special committee, to institute inquiries as to what can be done to secure such location, and to report the result of their inquiries, with such suggestions as they think best, at the next annual meeting of the committee.

The report was accepted and adopted.



Mr. Baxter, from the committee on finance, made the following report:

The finance committee beg leave to report, that they have examined the report of the treasurer, and compared the same with the vouchers presented, and find the same correct. While the report shows the financial condition of the society to be sound, the actual funds on hand, and available for the use of the society under any circumstances, are \$3,562 96 less than at the commencement of the year 1867. It is true, we have buildings nearly in readiness for the fair of 1868, and may, therefore, expect a much smaller outlay in preparation next fall than heretofore, so that with reasonable good weather for the exhibition, we may look for an increase of funds in our treasury. But your committee, in view of possible partial failure by reason of adverse weather, deem it wise to practice the most rigid economy consistent with a proper encouragement to the exhibitors in the offer of premiums.

It will be observed that the sum of \$3,250 is invested in the Agricultural Museum, in connection with the State Board of Education. While your committee believe this to have been a wise expenditure, and one if followed up by an additional expenditure, so as to finish the building and fit it up for the reception of specimens, and render it adapted to the purposes and objects designed, would have contributed more to the best and highest interest of agriculture in this State, and to the importance and influence of this society in the State, than any other expenditure by the society of equal amount; yet, they feel that in its present unfinished state, it is a reproach and injury to us, and of no possible benefit to any one. The State Board of Education have expended double the amount invested by this society in this museum, and it is still unfinished, and it will yet require an expenditure of at least \$4,000. Your committee therefore recommend that this society adopt some decided course of action in the matter, and either do their part towards the completion of the same, so as to enjoy the benefits, or cede all their interest in the same to the State Board of Ed-

uation, for the use of the State, and trust to the liberality of the State for reimbursement of money expended by this society.

Your committee further recommend that in consideration of the onerous duties thrown upon the Secretary by the extended operations of the Society, \$200 be given him in addition to the salary of \$600 for the last year, and that the salary for the year be fixed at \$1,000.

The report was accepted, and the committee adjourned till two o'clock P. M.

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TUESDAY, Feb. 4—2 o'clock P. M.

The Committee met, the President in the chair.

The President announced the appointment of the following special committees:

*On Testing Horses by Speed*—Mr. Sterling, Mr. Willcox and Mr. Gilbert.

*On Trials of Implements*—Mr. Greene, Mr. Allen and Mr. Miles.

The report of the special committee on Frescoe-work was read and accepted.

The report of the special committee on the examination of Vineyards was read and accepted.

The report of the special committee on Farms was read and accepted.

The following resolution was adopted:

*Resolved*, That the premium of a Gold Medal be awarded to J. M. Sterling, of Monroe, for his vineyard, in accordance with the recommendations of the viewing committee.

The following resolutions, recommended by the report of the committee on Farms, were adopted:

*Resolved*, That the premium on farms be divided into first and second, and that the first premium of \$60 be paid to E. L. Boyden, Esq., of Webster, Washtenaw county.

*Resolved*, That the second premium of \$40 be paid to L.

Woodward, of Rochester, Oakland county, as a testimonial of his skill in the cultivation and progressive improvement of a light land farm.

*Resolved*, That the Medal of the Society be awarded to E. W. Rising, of Richfield, Genesee county, as a testimonial of the appreciation of the Society of his skill and ability in clearing and rendering productive a heavy timbered farm.

On motion of Mr. Baxter, the report of the Finance committee was taken up and considered.

The following resolution was adopted:

*Resolved*, That the Society pay to the Secretary \$200 for services rendered the past year, and that the salary for the ensuing year be fixed at \$1,000.

On motion of Mr. Walter,

*Resolved*, That the Michigan State Agricultural Society do hereby cede to the State of Michigan, for the use of the State Normal School, for a Museum and Library, all its interest and rights in the building erected jointly by the said Society and the Michigan State Board of Education for a Museum and Library, on the ground belonging to the State Normal School at Ypsilanti, and that this Society will trust to the liberality of the State to refund to the State Agricultural Society the amount expended by it upon the same.

*Resolved*, That the resolution passed at the last annual session of the Executive Committee, granting certain funds to aid in the completion of said Museum, be and is hereby rescinded.

The memorial of Mr. Joseph Pierson, relative to an award on his horses at the late State Fair, was read and referred to a committee, consisting of Messrs. Walter, Greene and Willcox.

The Committee then adjourned till to-morrow morning.

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WEDNESDAY, February 5, 1868.

The Committee met, according to adjournment. The President in the chair.

Present, Messrs. Humphrey, Walter, Scranton, Baxter,

Barker, Adair, Miles, Gilbert, Allen, Greene, Willcox, Sterling, Fisk and Secretary.

The minutes of yesterday's proceedings were read and approved.

The Chair announced as the special committee on the permanent location of the State Fair, Messrs. Barker, Gilbert and Miles.

The committee on the premium list made a report in part, which was considered, amended and adopted, as follows:

The premiums offered in classes 1 and 2, shall remain as they were in the list of 1867.

In classes 3, 4 and 5, the lists shall read as follows:

For the best bull, three years old or over, .....	\$ 40 00
“ “ “ two years old, .....	30 00
“ “ “ one year old, .....	20 00
“ “ “ calf, .....	10 00
“ “ cow, three years old or over, .....	40 00
“ “ heifer, two years old, .....	30 00
“ “ “ one year old, .....	20 00
“ “ “ calf, .....	10 00

In class C, the premiums for herds remain as last year, but the premium offered for bulls with their progeny, shall read as follows, viz:

For the best bull of any breed and of any age, showing the peculiar points of his breed, exhibited with four of his calves, of any age up to two years old, .....	\$ 50 00
For the second best bull of any breed and of any age, showing the peculiar points of his breed, exhibited with four of his calves, of any age up to two years old, .....	25 00

Besides the rules relative to this class, there was added the following:

**RULE.** The premiums for herds shall not be awarded to the same competitor two years in succession, unless there is competition.

In Division A no other change was made.

In Division B, for horses, sundry changes were made, viz:

The class of stable of colts was ordered to be struck off the list.

To each class there was ordered to be added a class of premiums for colts.

The class of horses, part thorough-bred, and of roadsters, was ordered to be extended, and to read the same as the class for horses of all work.

In the sections for "Stallions of one, two and three years old," they shall read "stallions or geldings."

In the class of roadsters, third premiums were ordered to be added to the sections of driving horses, and an amendment adopted requiring the teams to be driven by the exhibitors.

In the class of carriage and buggy horses, the premiums were made to read as follows:

For matched horses 16 hands and over, four years old, \$50 and \$25.

For matched horses under 16 hands, four years old, \$40 and \$20.

Add to list, also: For best single horse 16 hands or over, driven for one mile with two persons in buggy, \$12 and \$8.

Saddle horses are to be a separate class, and shall read as follows:

For best trained saddle horse, ridden by either lady or gentleman, \$15 and \$10.

The next class shall read "matched horses." The premiums for matched horses were increased, viz: In first section to \$30 and \$20; in second section to \$20 and \$10, and the third section to \$15 and \$10. The premiums for cavalry stock were stricken out.

In Division C, the class for Angora goats was stricken out.

In Division D, the Secretary was ordered to divide the class heretofore comprising plows, cultivators, harrows, etc., into three classes, with sundry changes in each class, as marked on the list. Sundry changes were directed in the premiums offered in the several classes in this division.

In Division E, the premiums on wheat and clover-seed were

increased, and in the class of vegetables the various sections were increased by making the first premium \$2 and adding a second premium of \$1.

In Division F, a premium of a silver medal was added to the list for the best sample of factory-made butter not less than 25 pounds. Additions were made to the classes of bread, of wines, vinegars, etc., and also the Secretary was directed to organize a class for sundry articles not enumerated.

In Division G, the class of "Home-made" was unchanged, with the rule relative to exhibition at previous fairs stricken out. In factory-made the following arrangement was adopted, to be added to the list as it now stands, striking out the premiums for woolen goods:

Best display of goods from any woolen-factory in this State, medal and \$25, \$20 and \$10.

Best piece of fancy kerseymere, weighing 14 oz. or over per yard, diploma, \$5 and \$3.

Best piece of fancy kerseymere, weighing less than 12 oz. per yard, \$5 and \$3.

Best piece of plain kerseymere, weighing 14 oz. or over per yard, \$5 and \$3.

Best piece of plain kerseymere, weighing 12 oz. or less per yard, \$5 and \$3.

Best and largest variety of flannels made in Michigan, diploma and \$5.

Best piece of overcoat cloth, weighing 14 oz. or over per yard, diploma and \$5.

A class was adopted for the display of foreign furniture, and some changes were directed in the other classes.

In Division H, it was ordered that sections be made in the class for paintings, &c., for professional artists and amateur artists; that premiums be offered for collections of chromo-lithographs of \$5 and \$3, and for pastel paintings of \$5 and \$3; also for full size and cabinet photographs. In the class of sewing machines, premiums were offered of medals, and some alterations and changes were made in the other classes.

In Division I, in the classes for flowers the list was extended, and several third premiums were added. The following rule was added to the Special Rules:

"Premiums or recommendations shall be given only to such seedling or new variety as is fully equal in all qualities to the best varieties now grown, and which have not been heretofore exhibited."

The class for collections of fruits by congressional districts was stricken out, and slight changes were made in the classes of apples.

In Division K, it was ordered that a class should be made for the entry and exhibition of models of all kinds.

In Division L, the premiums for farms were made to read as follows:

For the best cultivated and skillfully managed farm of not less than 160 acres in extent, \$100 and \$50.

For the best cultivated and skillfully managed farm of less than 160 acres, \$75 and \$40.

To encourage tile-draining, a premium is added of \$20 for the best tile-drained field of not less than five acres, under the same rules as regulate the award for fields of over ten acres.

For crops of wheat, corn, oats, barley and rye, not less than five acres, premiums of \$15 are offered.

In orchards, a premium was added for the best orchard of not less than two acres, not yet in bearing, set out and planted with the best varieties of fruit, \$10.

For the best vineyard, in bearing, not less than half an acre, \$15.

For the best vineyard, bearing or not bearing, \$10.

The Secretary was directed to make out a list of premiums for sugar and syrup crops from the sorghum plant, within the range now offered.

Under the list of orchards and vineyards, the following premiums were ordered to be inserted:

For the best specimens of wine made from any vineyard in this State, not less than six bottles of each kind, to be exhib-

ited at the winter meeting of the Executive Committee, and if shown in bulk, not less than two gallons, \$10.

For the best specimen of grapes from any vineyard in this State, shown in samples of not less than twenty pounds, at the annual meeting of the Executive Committee, the samples to be at the disposal of the viewing committee, silver medal.

For the second best specimen of grapes, &c., diploma.

For the best half bushel of winter apples, containing not less than six named varieties from one orchard, to be shown at the winter meeting of the Executive Committee, and the apples to be at the disposal of the viewing committee, silver medal.

For the second best half bushel of winter apples, diploma.

The report on the premium list having been thus agreed to, was adopted.

Mr. Baxter, from the committee on finance, reported that the committee had examined the reports, statements and vouchers accompanying the Secretary's report, and had found the same correct. Several accounts had been presented to the committee for adjustment, and which are reported on as follows:

The committee recommend the allowance of the accounts of Messrs. Hoffman & Mayer, for \$27 15; of Francis Raymond, \$22 85; of J. O'Brien, \$21 00; of Wayne & Robinson, at \$200; of Dean, Brow & Co., \$33 43; of E. Williams, at \$42, deducting therefrom his subscription to the State Fair Fund. In relation to the accounts presented by H. N. Strong, the committee considers the items covered by the rent paid for the use of the grounds and track. In relation to the account of the Park House, we would say that we found on the subscription list delivered to the Secretary by the Detroit committee, a subscription unpaid of \$100, and we recommend that the account be credited against this subscription. All of which is respectfully submitted.

The report was accepted and adopted.

The committee then adjourned till to-morrow morning at 9 o'clock.



THURSDAY, February 6, 1868.

The committee met. The President in the chair.

A letter was read from Mr. Dorrell, of Jackson, excusing his absence on account of sickness in his family.

Mr. Walter, from the committee on rules and regulations, submitted the following report:

The committee on rules and regulations have had under consideration the rules of the Society, and make the following recommendations:

1. That Rule 13, as it now stands, be stricken out, and that it read as follows: "No member of the Executive Committee can compete for premiums in any class belonging to the department in which he is acting as superintendent, nor shall he appoint a judge in a class where he is an exhibitor.

2. Add to Rule 15, the words: "which statement shall be published."

3. Rule 18 shall read as follows: All persons desiring space on the grounds, or in the buildings, must apply for the same at the office of the Secretary, to the superintendent in charge of the department, who will be on the fair grounds the first day of the fair.

4. On page 23, the rule referring to the trials of plows, will read "may test," instead of "will test," in first line, and on page 24, the same change is made in the rule applying to seed drills, &c.

5. Strike out rule on page 34, applying to domestic manufactures.

6. The committee recommend that a rule should be adopted to place the sewing machines in Manufacturer's Hall, and that that building be enlarged and adapted for their display.

The report was accepted.

Mr. Philo Parsons tendered an invitation to the members of the executive committee, to visit the house of the Hon. H. P. Baldwin this evening, which was accepted.

On motion of Mr. Greene, the committee proceeded to the selection of viewing committees for the next annual fair.

The committees were then selected and chosen.

Mr. D. M. Uhl, by permission, presented a request that a rule should be adopted requiring three-year-old heifers to have had a calf previous to their exhibition.

The request was referred to the committee on rules.

On motion of Mr. Baxter,

*Ordered*, That the proceedings of the Society be prepared for publication and forwarded to the Secretary of the Board of Agriculture, at Lansing, to be published in the volume of transactions prepared by the State.

The Committee then adjourned till Friday morning at nine o'clock.

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FRIDAY, February 7, 1868.

The committee met. The President in the chair.

On motion of Mr. Willcox, the report of the committee on rules and regulations was taken up for consideration.

Mr. Willcox moved that rule 13 read as follows:

"No member of the executive committee shall appoint a judge to fill a vacancy in any committee, on any class in which he is an exhibitor, and any vacancy in such committee shall be reported to the President, and shall be filled by the executive committee in the usual manner of filling such vacancies."

Adopted.

Mr. Walter, from the committee on rules, reported the following, to be placed among the rules on cattle:

"All three-year-old heifers exhibited in the several classes of thorough-bred cattle as breeding stock, shall be required to have borne a calf previous to the exhibition;"

Which was adopted.

With some other verbal changes, the report on rules was adopted.

Mr. Gilbert, from the special committee to whom so much of the President's address was referred as relates to the tests of horses by speed, and the adoption of a class of citizens' pre-

miums, reported that the committee had given the subject a full consideration, and had come to the conclusion to submit the following resolutions:

*Resolved*, That the Society will dispense with the class of premiums known as citizens' premiums for the present year.

*Resolved*, That this committee recommend that the business committee be authorized to establish a class of premiums for the trial of horses by speed, and that the examination of such classes shall be made only on the last day of the annual fair, the premiums offered in which shall not exceed one thousand dollars in the aggregate.

The resolutions underwent a long discussion, but were finally adopted without amendment.

The committee adjourned till 2 o'clock in the afternoon.

—  
2 o'clock, P. M.

The committee met; the President in the chair.

The report of Mr. Starkweather, on his orchard, was read and accepted, and the award of the premium on orchards was made to John Starkweather, of Ypsilanti.

Mr. Greene, from the committee on so much of the President's address as refers to special premiums for trials of implements, reported that they had given the subject much consideration, and had come to the conclusion that the amended premium list covered the whole subject, and that no further action was necessary. Adopted.

On motion, the subject of the insurance of the Society's buildings for the sum of \$8,000 was referred to Mr. Walter.

On motion,

*Resolved*, That the thanks of this committee be tendered to Mr. Greene and Mr. Allen for their report on farms.

On motion,

*Resolved*, That the thanks of this committee are hereby tendered to the reporters of the *Detroit Post*, the *Detroit Tribune*

and *Advertiser*, and the *Detroit Free Press*, for their full and complete reports of the proceedings of this meeting.

On motion,

*Resolved*, That the thanks of the Executive Committee are hereby tendered to Messrs. Chittenden & Witbeck, of the Russell House, for their attentions and the accommodations and hospitality which they have afforded to the members of the State Agricultural Society.

On motion of Mr. Baxter,

*Resolved*, That the members of this Board will attend the Convention of Sugar-Growers, as far as practicable, during the session to be held at Sturgis, on the 18th of this month.

Mr. Greene, from the committee on conventions, reported that the committee had come to the conclusion to hold a State Agricultural Convention at Pontiac, on Tuesday, March 10th, and that said Convention shall last for three days.

The report was accepted.

On motion,

*Resolved*, That the Committee on Conventions and the Secretary be authorized to make the usual preparations for such Convention, and to prepare a list of subjects for discussion; and also to act with such committee as the citizens of Pontiac may appoint to aid in connection therewith.

Mr. Walter reported relative to insurance of buildings, stating that the premium demanded was three per cent., a rate which he did not consider advisable to accept. Adopted.

On motion, the subject was referred to the business committee, with power to obtain the best terms practicable.

On motion of Mr. Baxter,

*Resolved*, That the subject of an annual address at the next State Fair be referred to the President.

On motion of Mr. Sterling,

*Resolved*, That a committee shall be appointed by the President to view the several vineyards entered for premiums during the fruiting season, and that all entries shall be re-

quired to be made with the Secretary previous to September 1st, 1868.

On motion,

*Resolved*, That the thanks of the committee are hereby presented to the Hon. H. P. Baldwin for his attention and hospitality to this Board during their session in this city.

On motion of Mr. Greene,

*Resolved*, That the next State Fair shall be held on Tuesday, Wednesday, Thursday and Friday, September 15, 16, 17 and 18, 1868.

On motion of Mr. Greene,

*Resolved*, That a rule shall be adopted which shall provide that all members of viewing committees, who shall report themselves for duty and act as such, shall be provided with tickets for dinner on the days when so employed, and that the Business Committee are directed to provide the proper facilities for such meals.

The President announced as the business committee for the year, Messrs. J. M. Sterling, chairman; W. S. Willcox and Wm. Adair.

The President announced as the executive superintendents for the next State Fair, the following gentlemen, viz:

*On Cattle*—Messrs. G. W. Phillips and M. Miles.

*On Horses*—Messrs. K. C. Barker and W. S. Willcox.

*On Floral Hall*—Messrs. W. J. Baxter and J. M. Gilbert.

*On Mechanic's Hall*—Marvin Dorrell.

*On Manufacturer's Hall*—Messrs. L. S. Scranton and A. C. Fisk.

*On Implements and their Trials*—J. M. Allen.

*On Police*—J. A. Walter.

*Chief Marshal*—C. W. Greene.

On motion of Mr. Walter,

*Ordered*, That Mr. Greene be allowed \$25 for the use of horses, by the marshals at the last State Fair.

The President appointed Wm. Adair, Esq., as the delegate of

the State Agricultural Society to the American Pomological Convention, at its next biennial session.

On motion,

*Resolved*, That the subject of holding the next State Fair be referred to the business committee, with full power to receive and accept such proposals as they may deem for the best interests of the Society.

On motion, the committee adjourned to meet on the 15th of September next.

R. F. JOHNSTONE,

*Secretary.*

## BARRY COUNTY.

J. M. Nevins, Esq., sends the following account of the doings of the Barry County Agricultural Society for the year 1867:

There is probably as great a diversity of soil in this county as in any in the State. It ranges from the heavy clay, timbered soil, through the strong clay and loam oak-openings, to the light, sandy, shrub-oak plain. Fortunately, there is but a small proportion of the latter, while the timbered land is about one-third, and the timbered openings more than one-half, the entire county. Owing to this diversity of soil, any brief statement of the average of crops is neither as comprehensive nor as valuable as it might otherwise be, from the fact that heat and cold, wet and drought, affect different soils so diversely.

The very wet autumn of 1866 prevented the sowing of wheat as early as usual, and when sown, upon the heavier soils it was literally "mudded" in. A favorable winter, and wet, cool spring, gave it a good growth until the drought of summer dwarfed the heads, and the appearance of the midge in vast numbers almost completed the ruin of the crop. From six to twelve bushels per acre was about the range for timbered-land wheat. The openings fared much better, and good judges estimate the average as fully two-thirds of a crop on such soils. Another noteworthy circumstance is the fact that where the midge larvæ was deposited with the embryo grain, the insect hatched in such numbers as to *destroy* the grain, so that but little shrunken wheat was to be seen after threshing.

The average wheat crop for the county is estimated at a little less than two-thirds of the usual amount. Indian corn, on very heavy and very light soil, did but poorly, while the yield upon the openings was such as to make the crop more than an average one. The quality is also superior. Oats were a light yield. Hay, very good. Potatoes and buckwheat about two-thirds the usual average. Apples and peaches, quite abundant.

The Agricultural Society held its Fifteenth Annual Exhibition at Hastings, on the 8th, 9th and 10th of October. The morning of the 9th, and the greater part of the 10th, were very rainy, damaging the show and preventing a large attendance. Under the circumstances, the exhibition was creditable to the energy and perseverance of its patrons. The number of members was 325, and the number of articles 350. The premiums offered amounted to over \$400, and those awarded and paid \$138 70.

The annual meeting for the election of officers for 1868, was held on the 22d of December.

The following is the financial exhibit for the fiscal year ending December 20th, 1867:

## RECEIPTS.

1866.		
Dec. 20.	To amount cash on hand,.....	\$291 20
1867.		
Oct. 8, 9, 10.	To receipts for Membership,.....	325 00
" 8, 9, 10.	" " " gate fees and rents,.....	81 90
		<u>\$698 10</u>

## EXPENDITURES.

1866.		
Dec. 27.	By Paid for Secretary's services,.....	\$30 00
" 31.	" premiums to date,.....	9 75
1867.		
July 13.	" express on State reports,.....	1 80
Aug. 10.	" printing,.....	36 50
Sept. 30.	" " .....	25 00
Oct. 2.	" lumber, and hauling same,.....	30 00
" 8.	" improvement of grounds,.....	30 00
" 8.	" feed for stock,.....	17 00
" 9, 10.	" printing,.....	2 50
" 9, 10.	" expenses of exhibition,.....	33 50
Dec. 6.	" former indebtedness,.....	10 83
" 7.	" " .....	38 12
" 20.	" premiums to date,.....	138 70
" 20.	To amount cash on hand,.....	294 40
		<u>\$698 10</u>



OFFICERS FOR 1868.—A. Ryerson, Sen., President; J. M. Nevins, Secretary; S. C. Prindle, Treasurer; J. C. Bray, W. P. Bristol, S. Ingersol, John Keagle, T. Altoft, Directors.

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### BENZIE COUNTY.

The Benzie County Agricultural Society was organized in the summer of 1867. The Agricultural Association formerly organized at Benzonia did not embrace the whole county. Mr. A. B. Currier, the Secretary of the B. C. A. S., writes that the Society held its First Annual Exhibition at Benzonia, on the 9th and 10th of October. He says: "As our county is new, we could not expect anything remarkable for the first year. Still there was a good exhibition of produce and stock. The Society gave as 'Rewards of Merit,' three grades of cards—'Excels,' 'Excellent,' and 'Meritorious.' No admission fee was charged, but in future years we intend to charge both for admission and the entrance of articles. We shall also give cash premiums.

"The annual meeting of the Society will be held on the first Thursday in May. A commendable degree of interest is exhibited by the various towns, and the signs are promising for a strong county organization by the fore-part of next summer."

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### BRANCH COUNTY.

A particular account of the last exhibition and general condition of the Branch County Agricultural Society, forwarded by the Secretary, J. H. Beech, was, unfortunately, not received. A subsequent communication which came to hand states that besides the payment of the premiums awarded at the exhibition, the buildings belonging to the Society, and the fence around the grounds, have been put in good repair, and some improvements made. Nearly one thousand dollars of the

Society's indebtedness has been discharged this season. "The idea of getting nearly out of debt," it is said, "seems to give our population new hopes and new attachment for the Society." The Fourteenth Annual Exhibition was held on the Society's grounds at Coldwater, on the 25th to the 27th of September, and appears to have been creditable in character, and satisfactory as to pecuniary returns. The financial condition of the Society for the year ending December 20, 1867, is stated as follows:

Cash received,.....	\$1,427 99
Cash disbursed,.....	1,403 95
Balance,.....	<u>\$24 04</u>

The present amount of the Society's indebtedness is \$650.

### CALHOUN COUNTY.

The Secretary of the State Board of Agriculture has received no regular returns from the Calhoun County Agricultural Society, but is indebted to W. R. Schuyler, Esq., of Marshall, for the following able and interesting report on the fertilizing properties of

#### BONE-DUST AND SUPERPHOSPHATE OF LIME.

The Committee, appointed by the Calhoun County Agricultural Society at the last Annual Fair, to submit at its winter meeting a report upon the fertilizing properties of bone-dust and the superphosphates of lime, their adaptability to the staple crops of this county, and their relative value with barn-yard manure, respectfully report:

Liebig, in his last and final work, entitled "The Natural Laws of Husbandry," says: "The phosphates are among the most important agents for restoring the productiveness of the land—not that they influence vegetation in a more marked manner than other mineral elements, but because the system

of cultivation pursued by the corn and flesh-producing farmer, removes them from the soil in larger proportions than other constituents." The truthfulness of this assertion will be readily perceived, when we consider the elements contained in our cultivated crops and in the soils that produce them. An analysis of the grain of wheat, that part of the plant which is not again returned to the land, shows that nearly 50 per cent. of its ash constituents is phosphoric acid. This is equally true of nearly all the cereal crops.

Now, when it is considered that our most fertile soils contain a very small percentage of this essential element, that in many soils there is scarcely a trace, its real importance, in an agricultural point of view, cannot be questioned. Under the system of cropping, generally practiced in this and other wheat-growing States, the mineral elements of which the soil is *first* deprived are the phosphates. We freely admit that no special manures that have been used can justly be regarded as substitutes for barn-yard manure, which, when made from the plants the growth of the soil, possesses in itself all the essential properties of our cultivated crops. The question arises—Can the farm be made to sustain itself in productiveness, and remunerate its owner by careful husbandry and use of the manures made *solely* from the products of the farm? That highly productive farm in Seneca County, N. Y., of John Johnston, long and well known as an intelligent practical farmer and successful wheat-grower, has sometimes been cited, by those unacquainted with the details of his practice, as conclusive proof of the affirmative of this question. Unfortunately, the facts in the case warrant no such conclusions. Although Mr. Johnston may not have resorted largely to commercial manures, still, in connection with a liberal use of lime and salt, he has, in former years, made large purchases of corn and oil-meal, to be consumed on the farm by his purchased cattle and sheep, estimating the greater profits in feeding, from the valuable manure thus obtained.

If all the farmers in the grain-growing States had adopted

the wise practice of feeding out to their own stock all the appropriate products of the farm, Mr. Johnston could not have profited by an improvident system of other farmers in promoting, as he has, the fertility of his own farm. It is evident, then, that Mr. Johnston's practice, profitable as it has no doubt proved to be under the favorable circumstances around him, cannot be called a *self-sustaining* system admitting of general application. We think it needs no labored argument to prove that such a system, impracticable as Mr. Johnston evidently has found it to be on his own farm, is more or less so on *all* our best managed farms, in proportion to their natural fertility, where, under a judicious course of rotation in cropping, uniting grain-growing with stock-raising, nearly all the coarse grains, roots and hay are fed out on the farm, and the intervals of the wheat crop are prolonged. When this is the case, the fertilizing matter removed from the soil is nearly proportionate to that contained in the grain, butter and wool produced on the farm and sold, and in the growth of the young animals. As every bushel of grain and roots, every pound of cheese, butter and wool, every ton of hay and straw sold, carries away a portion of the organic and mineral elements of the soil, if something is not added to supply this deficiency beyond the ordinary accumulations of the barn-yard, gradual but certain deterioration of the soil must necessarily follow.

The largely increased yield of the wheat crop by the use of clover and plaster, on fields partially exhausted by tillage, the clover being plowed under as a green crop, has led some farmers to suppose that no other appliances were needed to retain or restore, if exhausted, the fertility of their land. That there are important benefits derived from the use of clover and plaster as fertilizers, we fully admit. It is a well substantiated fact that a soil may have an available supply of minerals for a wheat crop of 40 bushels per acre; if deficient in ammonia, the crop depending solely upon the atmosphere for its supply, the yield, under the most favorable circumstances of weather, will not exceed 18 or 20 bushels per acre, the average yield usually fall-

ing below this amount; that to increase this yield ammoniacal manures must be used.

If more ammonia was required for growing a wheat crop than what the plants themselves contained, that deposited in the soil by the winter snows, the rain and dews, would be amply sufficient for a maximum crop.

The valuable experiments conducted for years on the Rothamstead farm, in England, in the use of ammoniacal manures for the wheat crop, proved, most conclusively, that for every pound of ammonia organized in the wheat plant, four pounds were lost to the soil in perfecting its growth. A satisfactory explanation of this fact seems to be given in the interesting experiments of Prof. Way. The conclusions arrived at in conducting these experiments were, that plants require ammonia in proportion to the silica they contain; that the silica, constituting about 90 per cent. of the ash of the straw of wheat and of the other cereals, is obtained from the the silicates of ammonia, taken up in solution by the roots of the plants, the ammonia evaporating when its silica is deposited. We have now a satisfactory explanation why it is, that under an exhausting system of cropping on a wheat farm, the soil is *first* deprived of its ammonia, and *next* of the phosphates.

The clover crop, when used as a fertilizer, is a valuable aid in supplying this most important organic element of the wheat crop; we say *most* important, not because it is more essential than other organic elements in perfecting its growth, but from the well known fact that when the wheat plant is supplied with ammonia (hydrogen and nitrogen) it obtains its carbon and oxygen from the carbonic acid of the atmosphere.

In every instance, on the Rothamstead farm, when carbonaceous manures were used in connection with ammoniacal manures, the crop was increased only to that extent which the ammoniacal manures they contained would have benefited it. Thus 200 pounds of the sulphate of ammonia, containing 40 pounds of nitrogen and no carbon, had the same effect as 800 pounds of rape-cake containing the same amount of nitrogen

and 600 pounds of carbon also. Knowing the amount of ammonia expended in growing a bushel of wheat, we find that for a wheat crop yielding 35 bushels per acre, the atmosphere ordinarily furnishes about one-half the needed supply; the remainder must be obtained from the organic matter applied to the soil in manures.

Clover being a collector and not a destroyer of ammonia, and like all leguminous plants obtaining a large proportion of its ammonia through its broad leaves from the atmosphere, in plowing in a growth of clover we increase the organic matter in the soil for the benefit of the wheat crop. Under the true system of rotation in cropping on a wheat and stock farm, a large amount of valuable manure is obtained from the crops of clover hay fed out on the farm, its growth having been largely promoted by plaster and other timely mineral appliances.

Valuable as is the clover crop in furnishing essential organic matter to the cereal crops, its true position as a fertilizer should not be lost sight of. Plowing-in clover adds no mineral matter to the soil. Doubtless there are soils so rich in minerals that the clover crops, with the ordinary accumulations of the barnyard, will be the only fertilizers needed for a series of years to grow remunerative crops.

On one of the fields of the productive farm of the Hon. George Geddes, of Western New York, it appears that no fertilizers except clover and plaster have been used for the last 55 years, a heavy growth of clover promoted by plaster, being turned under as needed to keep up the supply of organic matter in the soil. This field, its intelligent owner asserts, has not yet shown any signs of exhaustion. It should be remembered that it comprises a part of one of those naturally highly productive farms lying on the Onondaga salt group of rocks. It does not follow that the sandy loams of Michigan, valuable as they are when rightly managed, are as rich in mineral elements as those favorably located soils in Onondaga County, N. Y. Their analysis proves the opposite, and that the soils of our State, like the generality of soils that are cultivated, contain a limited

supply of some of the mineral elements, especially the phosphates.

Admitting the fact, that so long as we grow heavy crops of clover we may continue to grow remunerative wheat crops, our own good sense will teach us if the mineral elements of which the soil is deprived by successive crops of clover and wheat are not again replaced, we shall in time cease to grow paying crops of clover or wheat. Has not this time already arrived as regards some of the *oldest* cultivated fields of this county? Have they not ceased to grow the remunerative crops of former years? There is no disputing this fact, if any reliance is to be placed upon the agricultural statistics of the county. What is true of this county, is true not only of this State, but all of the oldest wheat-growing States in the Union. Most truly has it been said, "Exhaustion is written on them in language too plain to be misunderstood." Have we been sufficiently mindful of the fact that the productiveness of our farms can only be maintained or restored by returning to the soil the elements of fertility which our crops are constantly carrying away?

What those elements are of which the soil is *first* deprived we have endeavored to show; nitrogen first, when no manures have been applied, next the phosphates. An analysis made some years since of the soil on the farm of one of your committee, revealed some facts which are doubtless applicable to many of the oldest cultivated fields of this County and State. In this soil there was a marked deficiency of organic matter and the phosphates, and a limited supply of potash. In computing the amount of phosphoric acid on an acre of this soil one foot in depth, containing 2,178,000 pounds, allowing each cubic foot to weigh 50 pounds, we have only 439 pounds of this element; the most fertile wheat soils of those capable of producing remunerative crops without the aid of manure, usually containing from three to five times this amount. Fortunately the nearness of the farm to public and private stables and an ashery, where for years manure and leached ashes, rich in min-

erals, including the phosphates, were obtained for the cartage, enabled the average yield of the crop to be largely increased at a comparatively small expense. Had the manurial resources of the farm been the sole reliance in its cultivation the subsequent history of these exhausted fields would have been very different. If, as we think we have shown, the clover crop and the ordinary accumulations of the barn-yard are insufficient to restore to the soil the *mineral* elements of which it is deprived by successive grain and other crops, we are necessarily compelled to resort to other fertilizers to restore this deficiency. The phosphates among the mineral elements necessarily first disappearing on a wheat farm, the value of bone-dust and the superphosphates cannot be questioned, the former containing about 50 per cent. of phosphoric acid. Whilst we freely admit the value of this important mineral element of most of our cultivated crops, we cannot rely upon it *alone*, as some manufacturers and venders of bone-dust have advised, to restore or retain the fertility of our soils. The fallacy of such an assertion will at once be seen when we consider the constituents of bone-dust as declared by its analysis. One hundred pounds of raw bones may be estimated as containing water, 11 pounds, phosphate of lime, 45 pounds, fat and gelatine, 38 pounds, of which about 5 pounds is nitrogen; of the phosphates about 50 per cent. is phosphoric acid. If all the nitrogen contained in raw bones is preserved, when they are applied to the soil, 100 pounds of bone would furnish the amount expended in growing a bushel of wheat; an application of 400 pounds per acre, as large an amount, perhaps, as it is ordinarily profitable to use on a grain and stock farm, would furnish 20 pounds of nitrogen, about one-third the quantity contained in the growth of clover, equaling one ton of dry hay per acre. Bones that have been for some time exposed to the weather, or that have been partially boiled or steamed to facilitate their grinding and hasten their decomposition, lose a part of their nitrogen, probably one-third their original supply. The quantity of course they still retain is valuable as far as it goes, in supplying the deficiency of nitro-



gen from other sources. Although bones lose a part of their gelatine by exposure or otherwise, the phosphates which comprise so large an inorganic element of our staple crop still remain.

The question of interest for the farmer to determine is, will the present price of this valuable fertilizer admit its profitable use with the ordinary market for our staple crops? Our own convictions are that it will. Supposing the ash of the wheat grain to comprise two per cent. of its whole weight, which is, perhaps, an over-estimate, one acre yielding 35 bushels of wheat, would take from the soil about 20 pounds of phosphoric acid, which is equivalent to about 45 pounds of bone-dust. A small amount of this valuable fertilizer would meet the requirements of a large wheat crop could it be brought in a soluble state directly in contact with the roots of the plants. As this is impossible, we think we may safely say, that in connection with a proper use of clover as an organic fertilizer, the wheat crop may be largely and profitably increased on impoverished soils by an application of 300 or 400 pounds of bone-dust per acre. On soils not greatly impoverished a smaller quantity would answer.

The practice of that distinguished agriculturist, the late John Delafield, of the State of New York, was to apply to the wheat crop about 100 lbs. of bone-dust to the acre, the governing principle as he remarked, in its application being to supply an amount equal to at least two years' consumption of any plants needing such nutriment. This small amount of bone-dust was doubtless amply sufficient on this highly cultivated farm, the object of its application being to keep up the supply of phosphates already in the soil. An important fact was not forgotten by Mr. Delafield, that it is far more difficult and expensive to improve the condition of the farm impoverished by an exhausting system of cropping, than to keep up its early productiveness by proper and timely appliances. It is sometimes the case that bone-dust, when no other manures are used, fails to materially benefit the wheat crop to which it is

*immediately* applied, hence the mistaken conclusion sometimes drawn, that it is of little value as a fertilizer; the reasons of this failure we think can be readily explained. Under an exhausting system of cropping, the soil being first deprived of organic matter, we could not reasonably expect any marked benefits from bone-dust alone when applied directly to the wheat crop, there being still in the soil a sufficient supply of the phosphates for maturing the crop, depending chiefly upon the atmosphere for its nitrogen, brought by the winter snows, the rains and dews. At this period of its exhaustion, ammoniacal manures are chiefly needed to supply the wants of the crop. For a time the cereal crops would be increased by ammoniacal manures alone, which the clover crop would largely supply. The soil would sooner be exhausted of its mineral elements—first the phosphates—than if no organic manures had been used. In the latter case less speedy, but none the less certain exhaustion of the phosphates would be the result.

Now we have no doubt that the oldest cultivated fields of this county and State, which no longer produce paying crops of clover and wheat, if analyzed would show a deficiency of both the organic and mineral elements that first disappear. If the phosphates now are the sole fertilizers applied directly to the wheat crop in an available form for forty bushels of wheat per acre, the actual yield of the crop will be proportionate only to the small supply of ammonia left in the soil in addition to that brought down by rains and dews. To increase this yield ammoniacal manures must also be used. If the wheat crop, under such circumstances, is only slightly if at all benefited when bone-dust *alone* is applied, not so the clover sown the succeeding spring, which, unlike the wheat plant, obtaining a large proportion of its ammonia through its broad leaves from the atmosphere, will be largely increased by the decomposing phosphates that were applied in the fall. With a clover crop thus increased we shall be prepared, when the time for another wheat crop arrives, to furnish to this crop the increased supply of organic and mineral elements of which the soil has been de-

prived by successive crops of clover and wheat. In thus promoting the growth of clover we are not only accumulating ammonia for the wheat crop, but are at the same time increasing the indispensable organic elements of plants.

Very erroneous opinions are sometimes entertained of the value of bone-dust as a fertilizer, because no marked benefits have attended its application to annual or summer crops. Phosphate of lime, it should be remembered, as it exists in bones, is almost insoluble in moisture. It must be made soluble by decomposition before it can be taken up by the roots of the growing crops. The time required to decompose these phosphates depends upon the fineness to which the bones have been reduced by grinding. When finely ground they are soon decomposed by the acids of the soil, and rendered in a fit state for assimilation by plants. A bone-mill, the invention of a Boston Milling Company, and used exclusively by them, reduces the bones in grinding, to the utmost degree of fineness; when mixed with the soil they soon decompose and become valuable fertilizers for summer crops. Bone-dust, as generally prepared is less finely ground and is not soon enough decomposed to materially benefit the summer crops to which it is applied.

Joseph Harris, the well known editor of the *Genesee Farmer*, and now the owner and successful cultivator of a large farm near Rochester, N. Y., in speaking of the *after* effects of bone-dust which failed to benefit the corn crop to which it was immediately applied, says: "The bone-dust helped the corn the second year, and now—the third year—the wheat has yielded four bushels per acre more than on land in the same field not dressed with bone-dust, and I expect the clover will show a still greater difference." The failure of the bone-dust, as stated by Mr. Harris, to benefit the crop to which it was *first* applied, at the rate of about 500 pounds per acre, was no doubt owing to its undecomposed condition. One hundred pounds of the insoluble phosphate is composed of 57½ pounds of lime and 48½ pounds of phosphoric acid. By adding to this

compound about 50 pounds of sulphuric acid, 82 pounds of lime in the phosphate unites with the sulphuric acid, forming sulphate of lime (gypsum); the remaining 68 pounds is a biphosphate or superphosphate, 100 pounds of which contain  $71\frac{1}{2}$  pounds of phosphoric acid and 28 pounds of lime, and becomes soluble in moisture by the increased proportion of phosphoric acid. On soils where no phosphates have been lately applied, an immediate fertilizer being needed for a summer crop, a well prepared superphosphate is decidedly preferable to an undecomposed phosphate. When there is not sufficient acid used to convert the whole of the phosphate into a biphosphate, a portion of the phosphate remains untouched. The quantity of acid used by Berry Bros., in their bone-mill, at Detroit, does not convert all the phosphate into a biphosphate, about 20 per cent. of this compound being soluble in moisture, as shown by its analysis. The proportion undissolved retains all its original value, and as it gradually decomposes subserves the wants of future crops. When a larger quantity of sulphuric acid is used, the price of the article is necessarily enhanced. The highly satisfactory results from a limited use by one of your committee the past season of Messrs. Berry's superphosphate as a fertilizer for the corn crop, will encourage its extended application another year. The effects of a properly prepared superphosphate upon a turnip crop are frequently almost magical, the crop being increased four or five fold by an application of four or five hundred pounds per acre.

Berry's bone-dust is a pure unadulterated article, reduced to the ordinary state of fineness. When used as a manure for the wheat and clover crops, it should be well mixed with the surface soil, in a partially fermented condition before the wheat is sown. Ample time will then be given for a portion of the phosphate to be decomposed and taken up in solution by the roots of the plants and organized in the grain. After the wheat crop has matured, the clover that was sown in the spring will be still further benefited by its gradual decomposition. As

potash enters largely into the organic constituents of the cereal and leguminous crops, and is much the largest mineral element of the root crops, ashes both unleached and leached, (the latter still containing an appreciable quantity of potash), are highly valuable as additional fertilizers in furnishing potash and other minerals for the cultivated crops.

In concluding this report, the question presents itself as worthy of consideration: Why is it that the wheat crop of Great Britain so much excels that of this country in the average yield per acre? Is it not chiefly owing to their unremitting endeavors to furnish the essential elements of their staple crops? The successful British farmer does not hesitate to purchase large quantities of ammonia and the phosphates, in the form of Peruvian guano. In former years hundreds of tons of oil-meal, rich in nitrogen, were annually exported from this country to be consumed by their cattle and sheep, it being well understood that the profits largely consisted in the valuable manure thus obtained. Besides the careful gathering and preparing the bones of their own animals for agricultural uses, innumerable ship loads of neglected bones have been exported from our shores as fertilizers for British farms. True it is, "that even the bones of slaughtered men from the great battle-fields of the continent, have been gathered and made to contribute their quota to the enrichment of British soil." If the sagacity and foresight of the English farmers, in thus providing for the enrichment of their own lands, cannot be questioned, the opposite practice of robbing the soil of the essential elements of bread and meat, cannot be too strongly condemned.

Under the system of cropping so widely prevalent, the most careful preparation and use of all the available bones of the State will not replace the phosphates of which the soil is deprived by the frequent recurrence of the wheat crop. To increase the productiveness of our lands we must lessen the number of acres on the farm annually devoted to the growing of wheat; keep more stock, and thus manure more highly from

the products of the farm and with other valuable fertilizers at our command. With our superior climate for the elaboration of grain, may we not confidently assert that the staple crops of our county and State would thus in a short time be largely and profitably increased?

W. R. SCHUYLER, *Chairman.*

O. C. COMSTOCK,

ASA B. COOK,

*Committee.*

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### CASS COUNTY.

In relation to the Cass County Agricultural Society, the Secretary, D. M. Howell, writes:

The list of premiums offered for 1867, amounted to over \$1,500. The Society owns ten acres of ground at Cassopolis. On this ground a hall for vegetables, grain, &c., 80x26 feet, with wing 26x26 feet, has been erected—the whole property costing not less than \$4,000. The Society is free from debt.

The Seventeenth Annual Exhibition was held here on the 25th to 27th of September. The attendance was large and the receipts were \$1,028, which was in advance of former years. The show of sheep and swine was very good; but horses and cattle were not so well represented as on some previous occasions. Other departments were well represented.

*Officers for 1868.*—Israel Ball, President; D. M. Howell, Secretary; C. H. Kingsbury, Treasurer.

### VOLINIA FARMERS' CLUB.

The Secretary of this Association, H. S. Rogers, writes that the interest manifested in it continues. The meetings during the year have been kept up according to programme, with the exception of the Implement Trial, which was deferred on account of the County Agricultural Society holding one about the same time as that appointed by the Club.

A public sheep-shearing was held by the Club, and although the weather at the time was unfavorable, some fine sheep were brought out, and various useful ideas elicited by the meeting.

A town exhibition of agricultural and other industrial products, was held in the fall, which from the limited time devoted to it was not perfectly arranged, but was encouraging in reference to what may be done in the future. Good horses, cattle and hogs were exhibited in considerable numbers, and the show of sheep is said to have been one of the best ever held in Western Michigan. Merinos were most numerous, but there were several pens of long-wools. The Club made a special effort to bring out a good show of grains, seeds, &c., and the display is said to have been well worthy of the effort. In fruits and vegetables, notwithstanding the severity of the drought, there is said to have been an excellent show in all classes. The ladies' department is represented to have been all that could have been wished.

An address was given on the occasion by the President of the Club, congratulating the members on the success which had attended the Association, and assuring them that by proper efforts, their next exhibition might be made to far excel that of the present year.

*Officers of the Club for 1868.*—M. J. Gard, President; H. S. Rogers, Secretary, with an Executive Committee consisting of five members.

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#### CENTRAL MICHIGAN AGRICULTURAL SOCIETY.

The Secretary of this Society, Rev. L. B. Potter, of Lansing, gives the following account of its doings for the year 1867:

We commenced operations with a sheep-shearing, held on the society's grounds, May 23d and 24th. Both days were stormy and very cold for the season, so but few persons attended, and there were only about fifty entries. Among the

entries were several Canada long-wooled sheep, and several crosses between the Cotswold breed and common Michigan ewes, producing a staple four to six inches in length. These *grades* were from the State Agricultural College Farm, and are the commencement of a series of experiments to ascertain whether or not a more valuable staple may be produced from carcasses that will be very desirable for mutton. The remaining entries were mostly of Spanish Merino, of which there were some very desirable animals.

Twenty-four fleeces were entered for scouring, and the accompanying tabular statement and report, will give sufficient information on that point.

On the 25th to 27th of June, the society had a horse-show upon their grounds. The number of entries, though creditable, was not large. There were several trials of speed, but under the published notice that the society would allow no gambling or betting, very little if any, of that reprehensible feature so common to these shows, was manifested. The show occurred during the *first* really *good* weather the farmers had seen during the season, and many of them who would otherwise have attended, felt obliged to remain at home; yet the receipts somewhat more than paid the premiums and expenses.

The Second Annual Exhibition was held October 10th; but as the horse-show came during the first fine weather of the season, the only rain of any extent that came thereafter was reserved for the last two days of this Exhibition. The first day was fine, and every one was jubilant. Entries from every quarter and of almost every variety, came in rapidly, until the No. 812 was reached, and then many of the entries were in large groups, with but a single entry No.

The new Hall, 30 by 60, which had just been completed, was well filled, and the display was said by good judges to equal anything ever seen in the State at such an exhibition. The building (24 by 80 feet) used last year as "Floral Hall," was this year set apart for fruits, vegetables, grain, dairy pro-



ducts &c., and the show in this department was very creditable to the many farmers who contributed to it.

In addition to the Hall above referred to, the Society has built forty covered and ten box stalls for horses, about fifty good stalls for cattle, and a sheep-house, conveniently arranged with thirty pens, capable of accommodating 200 sheep, and have made some other improvements on their grounds. The show of horses, cattle, sheep and poultry was both large and good. Only a few swine were on the ground, but the few were of the best breeds. In the department of implements, machinery, &c., the show was very fair. Large additions to each department would have been made but for the rain, which commenced at 4 o'clock a. m. of the second day, and continued to increase, with very little intermission, until the close of the last day. The expenses of this exhibition, including premiums awarded, were fully \$1,300, while the receipts reached but little more than \$1,000. This last amount would doubtless have been trebled if the weather had been favorable—for the reports of the few from the country were to the effect that their neighbors were coming *en masse*, but for the rain. The society offered no premiums and made no arrangements for the exhibition of the speed of horses, and had, moreover, advertised that no "trials of speed" would be allowed, believing that if such trials are necessary, they are properly to be confined to the horse-show, and should not be allowed to interfere with the Annual Exhibitions.

The general law for the incorporation of agricultural societies, was so amended by the last Legislature, that several counties, or parts of counties, &c., may unite and form district societies; and under this act, our society is now incorporated. The old law was also so amended as to exempt all fair grounds and improvements from taxation. A law was also secured to enable any of the cities or townships in the five counties of Ingham, Clinton, Eaton, Shiawassee and Livingston, to raise money by tax, for the benefit of this society. Under that act,

the city of Lansing has raised and donated to the society the very liberal sum of \$3,000; the citizens of Lansing have donated about \$200, and the Board of Supervisors of Ingham county gave us \$100. Thus the embarrassments referred to in last year's report have been greatly reduced, though not entirely removed. Our grounds, with the present improvements, are thought by good judges, to be worth \$8,000, and are said, by men well prepared to know, that they are susceptible of being made to excel any fair grounds in the State, now in use.

*Officers for 1868.*—L. H. Bartholomew, President; L. B. Potter, Secretary; E. H. Whitney, Treasurer; A. N. Hart, Robt. Nixon, W. F. Jenison, H. H. Norton and Josephus Woodhull, Directors for three years; Prof. M. Miles, Jno. Russell, Chas. M. Derbyshire, M. L. Stevens and Francis Monroe, for two years; Geo. B. Fuller, Geo. M. Cheney, Jas. N. Smith and J. P. Shaft, for one year.

The following is the report on scoured fleeces, referred to by Mr. Potter:

ENTRY NUMBER.	OWNER.	BREED OF SHEEP.	SEX AND DESCRIPTION OF SHEEP.	AGE IN YEARS.	WEIGHT OF SHEEP AFTER SHEARING, LBS.	WEIGHT OF UNWASHED FLEECES, LBS.	WEIGHT OF SCOURED WOOL, LBS.	APPRAISED VALUE OF SCOURED WOOL PER LB., \$1 BEING TAKEN AS A STANDARD.	PERCENT. OF SCOURED WOOL TO WEIGHT OF SHEEP.	PERCENT. OF SCOURED WOOL TO PERCENT. OF FLEECES.	PERCENT. OF BURKAGE.	AGE OF FLEECES IN DAYS.	QUANTITY OF SCOURED WOOL PRODUCED BY 1 LB. OF SHEEP IN A YEAR, EXPRESSED IN DECIMALS OF A LB.	VALUE OF THE PRODUCE OF 1 LB. OF SHEEP IN A YEAR, AS APPRAISED BY THE COMMITTEE.	PRICE CONT'D.	AMT. OF WOOL PRODUCED BY EACH ANIMAL IN ONE YEAR.	APPRAISED VALUE OF FLEECES GROWN IN ONE YEAR.
50	J. H. Clements,	Merino, .....	Ewe, "Ten Per Cent.," .....	1	48.60	11.68	5.44	\$0.90	10.36	46.78	53.22	395	.103587	\$0.0083	5.623	\$4.533	
29	N. C. Branch,	" .....	Ram, .....	2	75.60	10.31	5.33	1.06	7.46	52.12	47.88	335	.074003	0.0783	5.856	6.149	
33	Ag'l College, ..	" .....	" No. 66, .....	3	79.00	14.25	4.66	1.06	5.56	32.70	67.30	367	.056613	0.0633	4.630	5.000	
32	" ..	" .....	" No. 65, .....	4	79.60	14.60	4.91	1.00	6.14	33.86	66.14	357	.061375	0.0614	4.879	4.879	
35	" ..	" .....	Ewe, College Farm, No. 63, ..	5	75.00	10.94	4.00	1.10	5.06	36.56	63.44	333	.060826	0.0659	3.812	4.198	
40	" ..	Grade Merino, ..	" " " No. 97, ..	6	65.00	9.28	4.56	90	6.10	49.39	50.71	429	.060991	0.0649	3.964	3.568	
37	" ..	Merino, .....	" " " No. 67, ..	7	60.00	11.63	3.97	1.00	5.43	34.14	65.86	441	.064750	0.0643	3.285	3.285	
41	" ..	Grade Merino, ..	" " " No. 98, ..	8	70.80	11.00	4.60	1.00	5.26	40.91	59.09	446	.062511	0.0626	3.663	3.663	
44	" ..	Grade Cotswold, ..	Wether, .....	9	90.00	10.47	6.53	90	6.34	52.57	47.43	418	.063364	0.0607	5.708	4.862	
39	" ..	Grade Merino, ..	Ewe, College Farm, No. 70, ..	10	75.00	10.08	4.09	96	5.34	40.78	59.22	380	.062380	0.0498	3.923	3.792	
9	F. M. Cowles,	Merino, .....	" .....	11	80.00	10.19	4.13	96	5.09	40.48	59.52	370	.060735	0.0483	4.069	3.866	
34	Ag'l College, ..	" .....	" College Farm, No. 61, ..	12	66.00	7.19	3.28	1.00	4.77	45.31	54.69	380	.047735	0.0477	3.161	3.161	
42	" ..	Grade Cotswold, ..	Wether, .....	13	91.00	9.53	5.72	90	5.88	60.02	39.98	390	.048316	0.0471	5.352	4.283	
38	" ..	Grade Merino, ..	Ewe, College Farm, No. 67, ..	14	77.00	9.00	3.56	1.50	4.41	39.46	60.54	338	.044064	0.0463	3.396	3.564	

31	"	"	Marino,.....	Ram, "Huff's Silver Mine,"	15	3 118.50	14.41	4.83	95	4.11	33.33	95.17	365	.041135	0.0301	4.875	4.630
2	G. M. Cheney,	"	"	" "Pony,"	16	3 94.75	13.00	3.63	95	3.69	30.21	99.79	375	.069943	0.0651	3.500	3.325
43	Ag'l College...	Grade Cotswold,	Wether,.....	17	1 39.50	9.13	4.33	90	4.27	47.97	52.03	413	.042333	0.0341	3.320	3.055	
23	Jas. G. Smith,	Grade Marino,...	Ram,.....	18	3 145.00	12.23	5.05	90	3.77	41.21	56.79	336	.037697	0.0339	5.464	4.913	
1	G. M. Cheney,	Marino,.....	" "Bishop,"	19	3 136.00	13.26	5.31	90	3.69	26.36	73.64	373	.066376	0.0332	4.646	4.131	
36	Ag'l College,...	"	"	Ewe, College Farm, No. 63,	20	2 76.50	6.84	2.31	90	3.51	41.03	53.92	333	.063120	0.0316	2.637	2.413
52	Wm. Robinson,	Long Wool,.....	Ram,.....	21	1 136.00	7.53	5.22	90	3.29	69.32	30.68	435	.032963	0.0297	4.433	4.035	
45	Ag'l College,...	Grade Cotswold,	Wether,.....	22	1 99.50	3.13	4.19	90	3.63	51.64	48.46	413	.063770	0.0294	3.669	2.927	
20	L.M. Lamphere	Cotswold, .....	Ewe,.....	..	1 65.00	7.69	6.19	90	....	50.49	19.51	...	.....	.....	.....	.....	.....
21	"	"	"	"	1 86.00	7.94	5.22	90	....	65.74	34.26	...	.....	.....	.....	.....	.....

The preceding table shows the result arrived at by the judges appointed to report on scoured fleeces. The judges were Theron Ford, E. Parmelee and Hiram Paddock. Most of the sheep were shorn at our sheep-shearing, held May 23 and 24, 1867. Entry Nos. 1 and 2 were shorn about two weeks later at Mason, and some of those belonging to the State Agricultural College, were also shorn later, and were all shorn without washing. The weight of sheep and of fleece, in every case, was accurately taken and furnished to the Secretary, into whose hands all the fleeces were delivered. I then obtained sufficient sacking to tie up each fleece separately, and each package was plainly marked with the entry number. They were then taken to the woolen mill of E. Parmelee & Co., where they were carefully scoured, dried, put up again in the original packages, and carefully weighed, the weight of the sack in each case being deducted. Of the judges—Mr. Ford has been for several years a wool-grower and a wool-buyer, Mr. Parmelee is an experienced manufacturer, and Mr. Paddock, his foreman, has also been exclusively engaged for many years in handling and manufacturing wool. It is very much to be regretted that the appraisal of the relative value of each fleece was not made until after the scouring. The judges found it impossible to discriminate as carefully as they would have been able to have done at the time of the shearing. They were unanimous in saying, that in all such trials, the relative value of the staple should be adjudged, either on the animal just *before*, or upon the table immediately *after* the shearing, and before the fleece has been tied up. The judges took much pains, but have no doubt they erred in some cases. The portion of one fleece examined, may have been mostly from the shoulder, while that of another was mostly from the flank. L. M. Lamphere entered Nos. 20 and 21, but was not able to give the length of time the fleece had been growing, and the judges were obliged to rule them out. His Cotswold ewe, No. 20, showed a much larger per cent. of scoured wool to gross fleece and to weight of carcass, than any other sheep. The fleece was badly cotted, but if well cared for

hereafter, she will evidently produce a fleece valuable for combing purposes. The prize ram, owned by N. C. Branch, shows a very unusual per cent. of scoured wool to the gross fleece, and the prize ewe, owned by J. H. Clements, gives a large quantity and value of clean wool produced by one pound of animal in one year. It is hoped the table here given will be carefully studied by those interested in wool-growing and buying; and if any one supposes it a small task to produce such a table from the data on hand, let him take a single case, and with slate and pencil, make all the calculations, and find the final result in the one case. I think the prize-column here given has not been given in any of the trials reported by other societies, but it is no doubt the one which shows, more than any other, what we all want to know.

L. B. POTTER,

*Sec'y Cent. Mich. Ag'l Soc'y.*

Lansing, Dec. 4, 1867.

It is proper to remark, in reference to the above report, that the premium competed for was offered for the fleece of the greatest value in proportion to the time of its growth and the live weight of the sheep by which it was produced. As a basis for ascertaining the relative profits of sheep for the production of wool, merely, this is undoubtedly preferable to most of the plans on which premiums for fleeces have been awarded in the country. The actual value of the fleece in proportion to the weight of the sheep has been generally overlooked.

But the plan here adopted is open to serious objections. 1. It aims at but one point in reference to the profits of sheep, viz: wool; whereas the aggregate profits depend on the value of the *wool and mutton* produced. 2. The plan is fallacious in the mode adopted to ascertain the weight of the sheep during the period of the growth of the wool. They were weighed only once, and that at the time of shearing. As was remarked in discussing a similar subject on a previous occasion,\* a sheep

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\*Report of the Sec'y Mich. State Board of Ag. for 1866, pages 85-88.

may have been kept for ten or eleven months of the year in such a way as to produce the greatest growth of wool, and for a short time immediately previous to being shorn, so reduced in weight of body that the proportion of wool would be much greater than if the average weight of the animal for the year had been taken. To ascertain positively and fairly what sheep produce the greatest quantity of wool in a year in proportion to the weight of the body, they should be weighed at the time the wool begins to grow, and at stated periods, say once a month, up to the time of shearing, taking the average of the several weighings as the actual live weight of the animals during the growth of the fleece.

3. The sheep producing the greatest value in wool in proportion to live weight, may not be the best on the whole, as a breeding animal, even where wool is the sole object. It may be too small, defective in form and in constitution. It is but fair to say, however, that in the case under consideration, it was designed in the outset to have established minimum weights for the competing sheep.

If mutton, as well as wool had been taken into consideration in the above case, and the premium awarded according to the value of the two products combined, the "order of merit" for the animals and their standing in the "prize column," would probably have varied considerably from the representations of the table. Thus the grade Cotswolds were about twice as heavy as the sheep,—nearly of the same age,—which stands at the head of the table; they were in good condition, and would have sold readily for mutton at a good price; six dollars a head was in fact offered for them by a butcher, immediately after they were sheared; whereas the prize ewe, as well as most of the other Merinos of the same age, would have been unsalable for mutton. Conceding the correctness of the appraisal of the wool, there can be no question that the superior value of the grade Cotswolds for mutton, would have turned the scale in their favor as to aggregate profits.

## EATON COUNTY.

In reference to the doings of the Eaton County Agricultural Society for the current year, the Secretary, T. D. Green, of Charlotte, writes as follows:

Our Thirteenth Annual Exhibition was held on the 25th, 26th and 27th days of September. The show of stock did not equal previous years, the reason of which (I believe) was to be found in the amount of premiums offered by the Society. We have been trying for the last ten years to run our Society with fifty-cent memberships. Although many persons attended the exhibitions, the proceeds did not furnish the Society with the means to offer suitable premiums. One year ago it was decided to charge a fee of \$1.00 for memberships. Many were dissatisfied with that, and taking the two causes combined, the exhibition suffered very much. But the result was a benefit to the Society, as we received more money than heretofore, had less premiums to pay, and consequently we have more money to offer in premiums in 1868, by which means I hope to see a better exhibition of articles and animals.

The present grounds of the Society are too small (about eight acres); but at the annual meeting the Society decided to make sale of the present grounds and purchase 25 or 30 acres with a view to fitting them up in good style, with suitable buildings and a good track. The true friends of the Society are determined to stand by, and build up and sustain the objects for which it was organized.

The Annual Address was delivered by Edward W. Barber, Esq., of Charlotte. It was one of the very best ever delivered before our Society. I enclose a copy.

*Officers for 1868.*—David B. Hale, President; A. J. Ives, Secretary; E. Hayden, Treasurer. Mr. Ives declining to accept the Secretaryship, it remains in the hands of Mr. Green.

The address of Mr. Barber related chiefly to the settlement of the county of Eaton, and comprised so much that is specially



worthy of preservation, that the greater portion is herewith given:

Before another meeting of this Society, Eaton county will have entered its fourth decade. Thirty years ago, in November, 1837, the Legislature enacted that we should have a separate, independent existence. This occasion, then, makes a brief allusion to the early settlement of the county eminently proper.

The location of this land was the starting point. In July, 1831, the first parcel was located by H. Mason, on the southwest quarter of section two, lying on Grand River, in the town of Onseida. Some surveyor's or hunter's story of the romantic beauties of this region, where then the Grand River flowed on undisturbed, through the majestic solitudes—where undeveloped water-powers were abundant, and the scenery was as inviting as can be found in the Lower Peninsula, attracted the attention of the pioneer or speculator, and he at once obtained a foothold, and an unrealized dream. For, four years later, this same piece of land was sold for the non-payment of taxes, and was the first sale of land of the kind in the county.

Seven months later, in February, 1832, the land on which the village of Charlotte is situated, was purchased of the government. As early as that time speculators were on the alert to obtain the best lands and locations in Michigan. Geo. Torry and George W. Barnes, of Kalamazoo, while looking for land, discovered the prairie. Situated in the heart of Eaton county—carpeted in summer with flowers as lovely as ever were scattered by the hand of the Creator, to beautify and bless—where the wild deer roamed and fed unharmed and unmolested by civilized man—its marvelous beauty struck these land-lookers with wonder and admiration. They kept their discovery a secret, and in 1832, George W. Barnes became the purchaser.

I can easily apprehend how, coming upon such a spot as this, on the same autumnal day, in the silent woods, would fill the mind of the beholder with admiration, and would cause the

speculator to chink imaginary coin in his pocket. Like an oasis in the desert was this gem of a prairie in the wilderness. All around it was the dark, dense forest, inhabited only by the Indians and their game. Here was a spot already prepared for the husbandman. No wonder that men saw that it must be the centre of a rich agricultural district which the enterprise of the pioneer would develop from the wilderness—the germ of a city that would be attractive in aftertime because of its natural beauties and local advantages.

A few months afterwards, in June, 1832, what is now the village of Bellevue, was bought of the government by Luther Lincoln. It was, however, soon sold by him to the late Isaac E. Crary, of Marshall, by whom the village was laid out November 5th, 1835. Bellevue is thus the oldest village in the county. For many years its flouring mill and stores were the business points for over one-half the county, and it was nothing uncommon to see teams from Roxand, Oneida and Benton in its streets. Its early settlement, its inexhaustible quarries of limestone which were worked at an early day, its improved water-power, its stores where tea, tobacco, calico and hard-times were exchanged for black-salts, coon-skins, and other legal tenders of that period, gave it advantages over any other place in this region, and which it long retained.

Outside of the town of Bellevue but few parcels of land were located in the year 1833, while in the year following only two entries were made in the county, and these were in Bellevue. In 1835 considerable land was purchased in the south half of the county. And in November of that year Amos Spicer became the owner of the soil where the village of Eaton Rapids is situated. Mr. Spicer was a mill-wright, and his practiced eye and sound judgment led him to realize the great advantages that would inevitably result from an improvement of the splendid water-power at that point.

These were the first locations made at important points in the county, and were the prelude to settlement and improvement. Only one of the proprietors I have mentioned ever be-

came a resident of the county, and that one was Amos Spicer. At the beginning of the year 1836, nearly all of the sixteen townships were owned by the government.

That year the "Michigan fever" broke out in the Eastern States, and in the month of May whole townships were taken up with greedy avidity. At the East—and I remember how they impressed my boyish imagination—wonderful stories were told of the far-off Peninsular State, surrounded by magnificent lakes that surpassed in watery grandeur any inland seas on the globe, covered with forests of marvelous growth and majestic beauty, a soil that, lying idle and gathering richness through the ages, had become fertile as any that ever invited the labor of the farmer with the promise of golden returns; and, hence, in 1836, the star of empire, in its westerly course, settled over this part of Michigan.

Bellevue is entitled to the credit of being the place where a white man first settled, and Capt. Reuben Fitzgerald was the first settler. So far as actually taking possession of the soil and remaining upon it is concerned, he is the pioneer of the pioneers—the father of the county. July, 1833, witnessed his advent. The allotted period of a generation of the human race has joined the eternity of the past since that time. Then he was the alpha of Eaton county—its first and only citizen. His voice was the voice of its people. He was the people. How mighty the change that has taken place! To-day he is with us, a hale and hearty gentleman, and the county that then had but one citizen, has now 20,000 within its boundaries.

When Capt. Fitzgerald settled in Bellevue his nearest neighbors were at Marshall, and he was obliged to go to Jackson to get a grist of corn or wheat ground. Sylvanus Hunsiker and James Kimberly moved into the town the next spring, and John T. Hayt soon thereafter. All are now living except Mr. Hunsiker, and his widow resides at Bellevue.

A post-office was established in 1834, but with the express condition that some person should carry the mail once a week to and from Marshall for the receipts of the office. For the

sake of having communication with the world, Mr. Fitzgerald took the contract and became the first mail-carrier.

At the organization of the township, Capt. Fitzgerald, Sylvanus Hunsiker, Calvin Phelps and John T. Hayt were the only voters. As early as July 4, 1835, the patriotic citizens celebrated the national birth-day—the immortal rescript of human rights was read, an oration pronounced, &c. This manifestation of *amor patrie* took place in Capt. Fitzgerald's corn-crib, which thus early furnished good mental as well as physical food for men.

Sarah Fitzgerald, now the wife of John Spaulding, was the first white child born in the county. And so far as there is any honor attached to an event of some importance, but over which he had no control, Isaac E. C. Hickok, our present county clerk, is entitled to the credit of being the first white male child born in the county—at all events he is the first that is now living. These two persons are the involuntary pioneers of the second generation.

In most of the towns, during the year 1836, nearly contemporaneous settlements were made. I shall not attempt to allude to them in chronological order. The dawn of the year found no residents, outside of Bellevue, in any part of the county; and almost all the land was owned by the government—indeed, in the north half of the county, except a single quarter section in Oneida, not an acre had been purchased.

But in the month of January of that year John Montgomery became the first resident in the town of Eaton Rapids. He located upon land purchased the preceding year, and upon which he now resides. Those beautiful acres, appropriately called the "Montgomery Plains," attest the wisdom of his choice. In the succeeding April, Silas Loomis became his fellow townsman and neighbor, though half a dozen miles of woods and the Grand River lay between them.

In June, 1836, Amos Spicer, Pierpont E. Spicer and Benjamin Knight arrived in the village of Eaton Rapids, and in the spring of 1837, Samuel Hamlin and C. C. Darling joined them.

These persons, with the exception of Mr. Knight, formed a company, were the original proprietors of the village, and built the grist-mill in the summer of 1837. Mr. Knight commenced trading the same season, and for a long time his store was the headquarters of the pioneers in the easter portion of the county. There they bought the few necessities of life, assembled on rainy days, and sometimes got funny as they cracked their jokes and settled the county over again. Mr. Knight did not forget the scriptural injunction to multiply and replenish; for in March, 1837, his son Edwin was born—the first white child whose nativity was in Eaton Rapids. And in August, 1861, when the war-cloud gathered over the land, surcharged with the fierce lightning of treason, and muttering the dread thunders of rebellion, Edwin Knight enlisted as a private soldier in the army, and in January, 1863, was commissioned by Gov. Blair as 2d lieutenant in Co. D, 6th Michigan Cavalry. Eaton Rapids thus gave its first-born to the service of the country in the hour when the national life was imperiled, and men were needed to stand in the deadly breach and ward off the impending destruction.

Capt. James W. Hickok located in the town of Walton, February, 1836—in March, built the first house—and in June, moved his family. Parley Shumway followed in the month of August, and on the 4th day of July, 1838, a daughter came to celebrate the national anniversary—the first white child born in the town. Miles Bosworth was the first male child, and the empty sleeve he carries is a perpetual reminder of his bravery and gallant service on the field of battle, with the gallant Sixth Michigan Infantry.

The village of Olivet was not founded till 1844. Actuated by as noble a purpose as ever inspired a community, its founders and their successors have struggled, amid the discouragements of poverty and adverse circumstances, to build up an institution that shall be the pride of the county, and a credit to the State. Already their indomitable perseverance and persistent efforts are being crowned with success, as Olivet College

will remain a lasting monument to the memory of Shepherd, Reed, Hosford, and its other early friends and supporters.

In the month of September, 1836, Walter S. Fairfield, Jay Hawkins and Jacob Fuller, came to Vermontville and remained there, and soon afterwards Roger W. Griswold and Orren Dickenson joined them. Reuben Sanford's family was the first to move into the town; Mrs. Sanford, who lies buried in the grave-yard on the hill, was the first white woman who lived there, and Henry D. Sanford was the first white child born in the place. He, too, enlisted in the army as a private soldier when the call came sweeping over the land for three hundred thousand more, to stand as a living wall of flesh, to beat back the surging hordes of treason. Thus, Eaton Rapids, Walton and Vermontville, gave their first born to the service of the country.

These first settlers found nothing to live on, their post office was at Bellevue, thirteen miles away, and that was the nearest point where anything to eat, drink or wear, could be had for love or money. It took two days to make the trip from Bellevue to Vermontville, which can now be made in two hours. About half way between the two places, a little seven-by-nine shanty was built near a brook, and this afforded shelter for the families when moving in. The shanty gave the name to the brook, and now Shanty Brook is a name indelibly fixed.

Mr. Griswold, late that fall, started out in search of something to support human life. Like the Israelites going down into Egypt for corn, he journeyed till he reached Prairie Ronde, in the south part of Kalamazoo county, where he obtained a load of wheat. On his way homeward he had it ground, at Battle Creek, and after about two weeks absence, arrived in "the Colony" with the first grist of flour. No doubt it was hailed with as much pleasure, as to-day they would hail the advent of the iron-horse in that New England town, transplanted bodily as it was, into the heart of Michigan.

The public records show that the first religious organization in the county, was at Vermontville, on the 4th day of August,

1838. The Congregational society was then organized, and Wait J. Squier, George S. Browning, Warren Grey, S. S. Church, Oliver J. Stiles and Hiram J. Mears, were the first trustees—four of whom are now living, and members of the same society.

For me, around this town cluster all the fond recollections, the elevating influences, the sweet endearments of home. The old log school-house, where for nine months I learned the occult art of reading, writing and cyphering, has, like some of the pioneers, gone forever. No marble structure in the world, where money has aided art to the uttermost in producing something grand and beautiful, could ever become so deeply impressed upon the tablets of my memory, as has that uncouth school-house, and the three autocrats who for the winter months, reigned supreme within it.

In the grave sleeps the last sweet sleep of my friends and relatives. Father, brothers, cousins, friends—the young and the old—the brave and the beautiful—are gathered in that last resting place. Vermontville is my home, by all the ties that bind man to man on earth, and are made sacred in Heaven.

In the fall of 1835, Wm. Wall and Samuel Searles were the first to settle in the town of Eaton. For some time neither knew of the presence of the other, and it is said that one of them, while hunting for his own cattle, found some that did not belong to him, and in endeavoring to ascertain what these strange cattle meant, found he had a neighbor in another part of the town. Mr. Searles and family made the first settlement near the center of the county. He selected his home just outside of the Charlotte prairie, where he lived until his death, about two years since. During the first winter after he came here, Mrs. Searles died. There was not lumber enough to make a coffin nearer than Bellevue—there was no one to dig a grave, or aid in giving to the dead a christian burial. Mr. Searles yoked his oxen, hitched them to a rude sled, and laying his dead wife thereon, started one winter morning, for Bellevue. There was no road—not even a track—through the forest

Guided by blazed trees, and underbrushing a road when it was necessary, all day this melancholy funeral journeyed through the mournful solitudes of the unbroken wilderness. A husband bearing his dead uncoffined wife through the trackless forest to obtain the kind offices of fellow-beings to aid in giving her a decent burial, might break the heart of the stoutest, and bring tears to the eyes of the most obdurate. Mrs. Searles was buried in Bellevue, and her remains are there yet. Perhaps she was the first white woman who died in the county—the first loving spirit death transplanted from the wilderness of earth to the better land.

In the spring of 1837, Stephen Davis, who is now living in the village, was the first to locate upon this beautiful prairie. That season he turned the first furrow on the edge of the timber just south of the fair ground, and planted a crop. August 12, 1839, a post-office was established, and Jonathan Searles appointed postmaster. The route was from Battle Creek to Eaton Center, and was secured through Capt. Hickok's influence with Mr. Crary, then representative in Congress, from this State. Capt. Hickok came on foot from Walton, to deliver the commission to our first postmaster—one of the greatest local events of the time.

November, 1836, P. S. Spaulding, the worthy president of this society, built the first log-house on section 35, and became a resident of the town of Kalamo, and Hiram and Daniel Bowen became citizens of the town shortly afterwards. Kalamo can boast of the largest forest tree in the county, and probably in the State—at all events, its equal I have never seen mentioned. I have seen it many times and remember it well, for it was a marvel even in our wonderful wilderness. It was a gigantic sycamore, and stood about twenty rods west of the Bellevue and Vermontville road, just north of the farm now occupied by Judge Gridley. The tree was hollow from the bottom to the top, so that the blue sky could be seen from within it, and some one had cut a door so as to afford an entrance. There are several persons now living who had ridden a horse, full six-



teen hands high, through that door into the hollow, turned the horse around on the inside of the tree, and rode out again. I have seen this done myself, and was present on one occasion when the diameter of the hollow was measured, and I remember, as though it was but yesterday, that it was between sixteen and seventeen feet across the hollow on the inside of the tree. So many pilgrimages had been made to it that a hard-trod path was worn from the highway to it. Finally it was cut down for the purpose of taking a section of it to Marshall to be used as a grocery, but it was found impracticable to move it over the road to Bellevue without a great deal of labor in cutting down timber to give room for the corpse of this King of the Forest.

The same fall Robert Wheaton came into Chester, built a house, but went away again for his family. Levi Wheaton and Asa Fuller were the first to move in with their families, and Jared Bouton arrived with his family near the Jordan place in Chester, where land-lookers had built a poor little shanty, which they occupied. The Thornapple could not be crossed, and for seven long weeks, afflicted with sickness, they remained there unable to make the three or four miles that would take them home. Home! aye, a wild 160 acres of land on which not a tree had been cut. Think of waiting seven weeks to get to such a home as this over a route that now can be traveled in less than an hour.

The same migratory year, Orange Towalee laid the foundations of a home in Windsor, and John D. Skinner and Nathan H. Pray soon became his neighbors. As late as 1844 there was only about fifteen settlers in the town, and Edmund Lewis informs me that then it took him two days to go to Eaton Rapids to mill and return—hardly a two hours' trip at the present time.

On the 11th of November, 1836, James H. Nichols, Robert, James and Samuel Nixon arrived in Oneida, but did not move there until February, 1837. Solomon Russell was the first to

move into town with his family, and the next was Samuel Preston.

The experience of Robert Nixon and party is worth repeating. He said to me: "On the morning of the 28th of February, 1837, we started from the Looking Glass river, in Clinton county, for Oneida. One carried flour, another pork, and another blankets, &c. About noon, hungry and tired, we reached section 36, since known as the Canada settlement. The snow was two feet deep, and it took one of us all the afternoon to clear off a spot ten by twelve feet square. By dark we had three sides of a shanty built. Then we felled a large maple in front, made a fire, cooked our supper, chatted awhile, took our blankets and laid down on the damp ground. The weather was cold enough to freeze a white bear, and in the morning our clothes steamed as if they had just come out of the wash-tub."

Pontiac was their nearest point to mill, as the Thornapple was impassable, and it took them two weeks to make the trip. Wolves and bears were plenty, and Robert Nixon killed five bears in ten days. It is quite a remarkable fact that all the settlers in the town of Oneida, in the years 1836 and '37, are now living, except Mr. Kent, who was quite an old man when he came there.

In the fall of 1837, John Dow pitched his tent in the town of Roxand. Lemuel Cole came about ten days later. Mr. Dow has never had any experience that he cares about having repeated. All the early settlers knew him well; for in 1842, when the county commissioner system was abolished, and the board of supervisors were organized, he was a member, and from that year to this—twenty-six consecutive years—he has served in that capacity. He is entitled to the credit, however doubtful it may be, of being the father of the board of supervisors; and I doubt if there is a case parallel to his in the State.

On the 6th of November, 1837, following the trail underbrushed by Samuel and Jonathan Searles the year before, from Bellevue to Charlotte, Jesse Hart moved into and settled on the farm he now owns, in the north-west corner of Brookfield.

For two months he was not aware of the fact that there was another resident in the town. But it appears that John Boody and Henry Moe arrived a short time previous, though Mr. Hart started the first valuable and permanent improvement. That fall he built a log shanty, and covered it with troughs dug out of bass-wood logs. The roof was tight enough to keep out a wildcat, but admitted plenty of the free air, and was not snow proof. Joseph Bosworth was his nearest neighbor, only four miles away, while the Battle Creek meandering between them, and which in those days, before bridges had been introduced, on account of the mucky and miry bottom, furnished no pleasant fording places.

As I have already said, in 1837—thirty years ago—the Legislature gave to Eaton County a political existence. On the 9th of April, 1838, the first election for county officers was held. The canvassers were by law obliged to meet at the county seat to canvass the votes. A roofless log-house was the only thing in the similitude of a building upon the prairie. As the day was chilly they met under a clump of bushes to keep off the wind, and in this primitive office counted the votes, and declared the result. Two hundred and thirty-six votes had been given, and Amos Spicer and S. S. Church were elected Associate Judges; Robert Wheaton, Sheriff; Reuben Fitzgerald, P. S. Spaulding and William Wall, Commissioners; James W. Hickok, Surveyor; Sylvanus Hunsaker, Judge of Probate; Caleb Woodbury, Jr., Clerk; Levi Wheaton, Treasurer; Walter S. Fairfield, Register; and Samuel Clark and Benjamin Knight, Coroners. The records do not show that the county had a Prosecuting Attorney this year. Would it not be a fair inference that there were no rascals in those days? Perhaps they had no timber. Blessed days!

At the next election, held in November, 1839, there were 370 votes cast. Daniel Barber, of Vermontville, and Flavins J. Littlejohn, of Allegan, were the candidates for representatives in the Legislature, and Eaton, Barry and Allegan counties comprised the district. Mr. Barber was elected, and was the

first citizen of the county chosen to represent the people in the legislative councils.

Bellevue, Eaton, Oneida, Vermontville, Chester, Kalamo and Walton were the only organized towns. The highest number of votes given in any one of them was 125, in Bellevue; the lowest 11, in Walton.

At the election of 1840, Carmel had been added to the list of organized towns, having been previously attached to Kalamo. On the morning of election day the twenty voters in Carmel went in a body to Kalamo—headed by A. D. Shaw, who, one would guess from the record, was a sort of bell-wether among them—to exercise the citizens and the freeman's right. Arriving there the Kalamoites refused to let them deposit their ballots, telling them they had got a town of their own at home.

In order to be sure a boy was sent to Vermontville to ascertain of their representatives if this was true. It was, indeed, a verity. Carmel had been organized by the Legislature, and the first election was held at the house of Robert Dunn. So these twenty men, in search of a place to exercise the freeman's franchise, marched back again, organized their forces, and discharged their ballots—nineteen for Tippecanoe and Tyler too, and one for the other man, who ran a very little that year. The same nineteen also voted for Jacob M. Howard—now United States Senator—for Representative in Congress, and the same one voted for Alpheus Felch.

In 1842, Austin Blair, now our Representative in Congress, was elected County Clerk—which election marks the beginning of his honorable political career.

Not until the election of 1843 was there sixteen full-fledged towns in the county, and the first election at which 1,000 votes were cast was in 1850. Now we have over 4,000 voters.

Five of the first settlers in their respective towns have been elected members of the Legislature—James W. Hickok, John Montgomery, John Dow, Robert Nixon and P. S. Spaulding. Let no man say that the miniature republic of Eaton county has been ungrateful.

But I forbear lest you weary of these details of our early settlement and progress. I have recited them in order to challenge attention to the steady onward march that has been made, and pay a slight tribute to the pioneers. When we look back at the difficulties they had to encounter—at the dense forest that covered the soil—at the cost of marketing their products—we can only marvel at the improvements that have been made. Year by year, under the sturdy blows of the axe, the forests have receded and the fruitful fields taken the place of the mighty wilderness. Hard work was their lot—their only guarantee of success.

An historical incident affords a good illustration of their career. In the war of 1812, at the close of the battle on Lake Champlain, Sir George Prevost, commander of the British land forces, realizing that the destruction of his majesty's fleet had rendered the further invasion of the United States impossible, and wishing to occasion some delay while he could prepare to retreat, sent a flag of truce to the young and gallant McDonough, requesting him to say by what means his victory was gained. The commodore was busy repairing damages, attending to the wounded and alleviating their sufferings, and had no time to correspond with the enemy. Hastily seizing a pencil, he wrote at the bottom of the note, and returned to the General this laconic reply: "By hard fighting, sir."

Should we ask our pioneers by what means they subdued the wilderness, and laid the foundations of the prosperity we behold on every side, a slight paraphrase of the reply to the inquiring British General would tell the story: "By hard working, sir."

And let us thank the Preserver of All that so many of them are left to-day, to enjoy the fruits of their labor, and with us drop a silent tear to the memory of those who have laid down to rest in the silent city of the dead.

Brave, strong, earnest, honest men were these pioneers. Those I have named do not deserve mention more than hundreds of others, only they happened to be among the first.

As fathers of the county, they merit our warmest words of commendation—our grateful remembrance. They laid, broad and firm, the foundations of our present prosperity, which is rich with the promise of future progress. Their monuments are in the fields made fertile by their labor—in the golden harvests and the waving corn—in the orchards that they planted; and in every branch laden with fruit until it bows to the earth as if in their worship—in the school-houses and churches that stand as the symbols of a christian civilization—and above all, in the hearts of their children.

Speaking in the name of another generation, let me say, in its behalf, that out of the depths of our hearts we bless you, brave fathers, and heroic mothers, of thirty years ago. It is not your glory to have your names engraved upon the imperishable monumental marble that a grateful people, with tears in their eyes and sorrow in their hearts, rears to the memory of those who fell in the forefront of battle that the nation might not die; yet not less heroic than theirs have been your struggles, and toils and sacrifices, amid sickness and adverse fortune, to reclaim a vast region from the savages, and make the wilderness blossom as the rose.

Florence Nightingale and Clara Barton have worthily a name and a fame as the representatives of woman's fortitude, heroism and devotion on the field of battle, in the camp and in the hospital, where man's suffering needs her angelic ministrations to alleviate its horrors and mitigate its pain; but there are thousands of unnamed heroines among the pioneer mothers of Michigan, if patience, fortitude and devotion are the tests.

The work of the past has been the work of preparation. As Eaton County enters upon its fourth decade, a new era opens its shining gates. Before another meeting of this Society that hippogriff of modern civilization—whose soul is fire and whose breath is steam—will traverse the county and open it up to the world. Whatever delays and hindrances there may be, before that time the Grand River Valley and the Peninsular Railroads will be living, snorting, steaming realities.

With less waste land than any county of the same area in the State—with a population noted for its industry and intelligence—with timber in abundance and coal beyond calculation—with a fruitful soil that needs only intelligent cultivation to bring sure returns—with villages budding into cities—there is a goodly prospect ahead.

War no longer crowds the muscles and the brain of the country into its insatiate maw. The aristocratic creed that defined labor as dishonorable, has passed into oblivion with the fables of mythology. For the North and South, under the benign influence of peace, new fields are opening to enterprise and labor, with the promise of a sure reward. There is a limitless field in which enterprising talent may put forth its energies without either exhausting itself or arriving at that perfection which only superhuman genius can surpass.

To keep pace with this progress should be our aim. Intelligent labor, aided by capital, is the great desideratum. Labor and capital may flow over the land like the waters of the Nile over the plains of Egypt, but if the people lack the knowledge to use the current as it flows, it will flow back again in a few years and leave them poor, helpless and worthless.

All we need is the development of our resources. They are many—lying on the surface of the soil and buried underneath it. Capital should co-operate with capital, labor with labor, and each with the other, in completing our railroads, in building manufactories, and compelling greater prosperity.

The people of a country with uncultivated farms, with unexplored mines, with primeval forests, with silent, untraversed rivers, with slow growing towns and sluggish enterprise, never can rank high among the nations. Another people, possessing quick appreciation and indomitable energy, will take from them the gold that should rattle in their empty coffers, and leave them poorer at the end of each recurring year.

Men of Eaton County! as we enter upon the new era, the threshold of which we are about to pass, let us guide the onward flow of enterprise, progress and improvement, until they

shall have deposited their golden alluvion on every acre of our soil.

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### GENESEE COUNTY.

The Executive Committee of the Genesee County Agricultural Society, through its Secretary, F. H. Rankin, makes its eighteenth annual report, which is substantially as follows:

It will not be necessary to refer particularly to the season of the year 1867, as all farmers will remember that the spring was late, wet and cold, by which all the work upon the farm was retarded, and planting and sowing delayed until a very advanced period. The fall weather, on the contrary, was uncommonly dry, and generally favorable to the maturing of crops. There were no damaging frosts, until everything was out of the way, and the late autumn was genial and protracted. The long continued dry weather, however, caused a general scarcity of water, by which stock in many places suffered quite severely.

#### FIELD CROPS.

*Winter wheat*, in quantity, was about an average crop, per acre, of which the quality was very good. Owing to the wetness of the season, less spring wheat was sown than usual. The quality of this, too, was excellent. We should estimate that while the yield of both kinds was a full average to the acre, the breadth sown was twenty-five per cent. below the average of land usually assigned to this crop, in the county.

*Oats*.—For the same reason, less oats were sown than usual by probably one-half. The quality was very good, but the yield below an average. For the whole county, we should judge the amount harvested was fifty per cent. below the usual average yield.

*Indian corn* was very unequal in its growth and yield. The season for planting was very unfavorable, but little seed being got in before June. It made unexpectedly good progress, however, during the summer, and the fall was long and favorable



for its coming to maturity. In consequence of this, the quality of the corn was very good, though the yield was, upon the whole, somewhat less than an average.

*Barley.*—From the cause already stated, as affecting the planting of other crops, less barley was sown than usual, also. The produce per acre was light.

*Hay.*—The quality of hay was uncommonly good, the yield above an average, and it was saved in prime order, the weather for harvesting being very favorable, and presenting quite a contrast to that of 1866. Notwithstanding the large crop, the price is kept up by an extensive export demand, which has caused many farmers to believe it more profitable to dispose of their hay, than to winter their stock upon it.

*Potatoes.*—The planting of potatoes was likewise affected by the wet and cold weather of the spring, which caused a diminution of the acreage. The crop subsequently suffered from the drought of the more advanced season, causing a light crop—say three-fourths of an average per acre. Both causes combined, probably diminished the produce of the county on the whole, to half an average crop. The quality was good and sound, the rot which affected the potatoes so seriously in 1866, not being apparent this year.

#### HOP CULTURE,

which looked so promising in 1866, met with a severe check this year by the ravages of insects, which almost destroyed the crop. While it is hoped that this blight will prove but a temporary evil, it undoubtedly has had the effect of checking the disposition which had prevailed for extending the cultivation of this usually profitable crop. Without referring exclusively to this misfortune, we could wish that the farmers of our county were not so easily discouraged by a single reverse. There is no crop, whether it be hops or wool, or something else, that is entirely exempt from vicissitudes; and the whole history of agriculture demonstrates that no product finds unvarying success in its culture at all times.

## SORGHUM.

The quantity raised this year has been very limited; but as the season seemed to be favorable for the development in the plant of the saccharine matter which forms its main value, a quality of syrup has been manufactured, very superior to that of the previous year, when the weather was less favorable to its production. It seems to be a crop on which a good deal has yet to be learned from practical experience, to enable our farmers to raise and work it to the best advantage.

## FRUIT.

*Apples*, the staple fruit of this county, have been generally a good crop, though they did not realize the extraordinary promise of the trees at the time of blooming. The yield, however, was unequal, some orchards having borne extremely largely, while others gave but moderate crops. Altogether, we consider the product was a full average, and the quality good in keeping properties and otherwise. *Pears* and *Plums* seemed to be scarce; but *Peaches*, which had almost died out as a crop in this county, are again reviving, and wherever there were trees, plenty of peaches were reported in 1867. *Grapes* thrive well in our climate and soil, and increased attention seems annually to be bestowed upon their culture, with gratifying success. *Small fruits* of all kinds were likewise abundant this year.

## STOCK.

In *Cattle* we have to report a continuation of the interest felt in maintaining a good standard of blood animals. Owing to the high price that hay brings, however, farmers are selling their stock more freely than they would, were it not that they consider it so expensive to keep them. Transactions like these generally equalize themselves, and find their equilibrium. Without stock to eat it, fodder will be of little value, and as soon as the number of animals become sufficiently diminished, we may find the value of hay correspondingly reduced; and so this method of saving or making money defeats itself. On ac-

count of the very dry weather during the fall months, the cattle are rather thin in condition.

*Horses.*—With regard to horses, we have but to repeat the observations of last year's report. The increase in valuable horses keeps pace with the general progress in agricultural pursuits.

*Sheep.*—In respect to sheep, we cannot do better than repeat what has been said by the Executive Committee of the Sheep-Breeders' and Wool-Growers' Association of this county.

*Pigs.*—In hogs we have no great changes to note from the circumstances of last year. There is a full supply—the Chester-White blood seeming to retain the preference in the judgment of the most careful and experienced farmers. The hogs fattened do not seem to be equal in weight to the average of previous years.

#### MANUFACTURES.

The usual branches of manufactures in the county continue to be in a flourishing condition. New mills and machinery for the manufacture or finish of lumber seem to be needed by the demand, as they are constantly increasing in number. It also affords us pleasure to note the progress of another branch of manufacturing industry, in the erection, during the past year, of a large factory, and commencement of the woollen manufacturing business in the city of Flint, by Messrs. Stone & Willard. With four looms running, they are now manufacturing about 500 yards of cloth per week, of a most excellent quality.

The prosperous condition of the Society has enabled your Committee to carry on the improvements on the Fair Grounds, by the erection, since our last report, of extensive and durable ranges of sheds and stabling, for the use and accommodation of exhibitors of horses and cattle; and a new stand for the judges of horses. The cost was about \$550—and the great advantages of such convenience for the shelter and safe keeping of valuable animals is obvious to all.

In preparing the list of premiums for the Eighteenth Annual

Fair, which was held on the 2d, 3d and 4th of October, various modifications were made with a view of increasing the competition. The premiums on farms were increased in number, and largely in amount; and special premiums in addition to those in the premium list, were offered for horses.

The Fair was very successful, whether as regards its pecuniary results, the character of the exhibition, or the numbers in attendance; in all respects being beyond any one previously held.

The subject of disposing of the exhibition grounds of the Society, or exchanging them for the purpose of obtaining others more extensive, and affording better accommodations, was considerably discussed, but finally left with the Executive Committee.

The finances of the Society were stated by the Treasurer on the 8th day of January, 1868, as follows:

## RECEIPTS.

Cash on hand at settlement, January 9, 1867, .....	\$ 26 35
Receipts from sale of Tickets at Annual Fair, .....	1,894 98
Receipts from rents and licenses at Fair, .....	239 00
Receipts from percentage on premiums for trotting, .....	22 50
Total receipts, .....	<u>\$2,182 83</u>

## EXPENDITURES.

Paid bills of labor on Fair Grounds and buildings, .....	\$ 194 50
Paid bills of material for buildings and fixtures on Fair Grounds, .....	461 71
Paid for hay used during Annual Fair, .....	33 70
Paid bills for printing for 1867, .....	124 06
Paid Marshal's assistants, gate-keepers, watchers and police, during Annual Fair, .....	122 00
Paid assistants in Secretary's office during Fair, .....	20 00
Paid Treasurer's assistants during Fair, .....	27 00
Paid miscellaneous expenses, .....	17 01
Paid premiums of 1866, to date, .....	57 25
" " 1867, " .....	698 50
Balance on hand, .....	427 10
Total, .....	<u>\$2,182 83</u>

*Officers for 1868.*—E. W. Rising, President; F. H. Rankin, Secretary; Oren Stone, Treasurer; with twenty-one Vice-Presidents, and an Executive Committee, consisting of seven members.

The Society is congratulated on the prosperous condition of its affairs, not surpassed, it is safely presumed, by any similar society in the State, and probably equaled by few.

**SHEEP-BREEDERS' AND WOOL-GROWERS' ASSOCIATION.**

The following is taken from the Second Annual Report of the Executive Committee of the Genesee County Sheep-Breeders' and Wool-Growers' Association:

The committee have pleasure in stating that there seems to be no diminution of interest on the part of the sheep-breeders of the county, in the object for which the association was organized.

Preparatory to the Annual Sheep-Shearing of 1867, your committee adopted a more systematic classification of the sheep for which premiums were to be offered, than at the previous shearings held here. This classification embraced four grand divisions, as follows:

1. American Merinos, where weight of fleece is mainly considered.
2. Fine Merinos, yielding a wool adapted to the manufacture of fine broad-cloths, and other fabrics requiring a staple of equal quality.
3. Delaine Merinos, yielding a wool adapted to the manufacture of delaines and similar fabrics; length of staple being a leading consideration, but in which neither extreme fineness of fibre, as required in No. 2, nor great weight of fleece as required in No. 1, are to be regarded as absolute essentials.
4. Combing-wool sheep—thoroughbred, yielding a wool adapted to combing, &c.

For all the practical purposes we believe this classification will be found to work well, at least until new aspects of the woollen manufacturing interests may demand its modification.

As recommended at our last annual meeting, upon consultation of this committee with the Executive Committee of the Genesee County Agricultural Society, it was deemed advisable, besides the premiums for sheep, and shearing, to offer premiums for stock, embracing bulls, stallions and jacks; the success of the experiment, however, was not such as to warrant us in recommending the continuance of the practice, as an adjunct of the shearing exhibition proper.

The Second Annual Shearing of this Association was held on the 9th and 10th of May, 1867. The spring it will be recollected, had been backward, and unfavorable for agricultural operations, and the time of the meeting found the farmers in the midst of their spring work, with the weather still cold and ungenial. Notwithstanding these draw-backs, the attendance was good, and the show of sheep very superior. In consequence, however, of the cold, no shearing was done the first day, nor until noon of the second, and some of the best animals exhibited were not shorn, their owners being unwilling to risk their exposure to the cold and wet. But an examination of the result of the shearing that was done, as reported by the judges, we think will compare favorably with that of any similar exhibition which has come under our notice, in this State or elsewhere.

In the spring months a severe and fatal epidemic raged among the sheep in this county, by which large numbers were lost. It has been generally ascribed to the poor condition of the sheep when entering upon the winter, acted upon by the wet season and exposure of the flocks in the spring. The loss from this disease is considered fully equal to the natural increase. The nature of the season and health of the sheep had also their effect upon the wool, the quality of which was not so good, though the condition was better; and fleeces weighed lighter on the average than in previous years.

The market for wool has been steady throughout the year; the prices uniformly averaging about 25 per cent. below those of 1866. This reduction is to be ascribed in a great measure

to the heavy fall in the value of cotton, with which other raw material for clothing always more or less sympathizes; and also to the extra importation of wool and woollen goods, to avoid the tariff about to take effect in the spring of 1867.

Owing to fodder bearing a high price, and to the diminished value of wool, many farmers have disposed of their sheep for whatever they would bring. A much greater number than usual have consequently been slaughtered this year. We should estimate that from this cause, which with some amounted to an actual "panic," in conjunction with the loss by disease already referred to, the whole number of sheep in the county at the present time is at least ten per cent. less than was held a year ago. We cannot but think that some of those farmers who have been in such haste to get rid of their flocks for any nominal price they would fetch, will see reason to regret their precipitancy; though in the abstract such action has this redeeming feature, that it will tend to raise the average standard of quality of those which remain; as it is reasonable to infer that, under the circumstances, the most inferior animals of the county are those which would first be allotted to the knife, when the primary object is but to avoid the expense of keeping them.

But we can see no cause for discouragement or alarm to the prudent sheep farmers of Genesee county. Let them continue to breed carefully with a view to obtaining length of staple and thickness of fleece in their wool; with a strong healthy constitution to their sheep; taking good care of their flocks as regards food and shelter; looking systematically to the cleanliness and proper condition of their wool in its preparation for market, and we are well satisfied they will find as much profit in this, as in any other branch of the farmer's business.

We have observed with satisfaction the importation from Canada, during the past year, of a number of full-blooded Leicester, Cotswold and Southdown sheep, of the most celebrated breeds of that Province. Also some very superior full-

blooded Merino rams of the Infantado, or Hammond stock, from Vermont.

The flocks of the county have entered upon this winter in a healthy, good condition; not very fat, however, owing to the effect of the long continuance of dry weather upon the herbage in the fall; but presenting such a contrast to what their condition was a year ago, as to dissipate any apprehension of a recurrence of the epidemic of the last spring.

We are indebted to William A. Morrison Esq., of the city of Flint, for the following statistics and remarks upon the wool trade of this county, for the year 1867:

" Amount of wool sold at Flint, .....	425,000 lbs.
Estimated amount sold at Fentonville, .....	100,000 "
" " " Linden, .....	25,000 "
" " unsold, .....	25,000 "
Total for the county, .....	<u>575,000 lbs.</u>

"The above estimate does not show any material increase over last year, which is accounted for to some extent by heavy losses in sheep, occasioned by diseased condition last year.

"Those farmers who have not adopted the advice heretofore given and now renewed, in regard to the manner of putting up wool for market, so that it may be brought into first-class condition, will do well to note the following: that is—washing thoroughly, and shearing at the proper time after washing; and putting nothing inside the fleeces. The tags ought to be washed and kept separately. One reason why wool brings a higher price in some other parts of the country is simply the fact, that when a farmer sells a fleece of wool, he sells that and nothing else. If he has tags, they are sold for what they are worth. Let all the farmers of Genesee county practice upon the above recommendations a few years, and the result would be greatly to their benefit.

"The practice of 'stuffing' fleeces with dead wool is to be severely reprehended; and no honest farmer will do it."



In conclusion, we would repeat our solicitation that the Sheep-Breeders' and Wool-Growers' Association may receive the continued countenance and support of the farmers of Genesee county. Its annual sheep-shearings may be made a valuable and attractive means of drawing together the best sheep, from at home and abroad. Assuming it to be the intention of our sheep-raisers to persevere in their efforts to improve the breed of their flocks, these occasions will afford an opportunity not otherwise attainable, of exhibiting the fine qualities of their animals and wool, and contribute, more than anything else to spread the knowledge of their superiority; while the friendly rivalry of the members will constantly promote a healthy competition for increasing excellence.

The following report, made in accordance with provisions adopted at a previous meeting, was accepted and adopted by the Association:

1. *Resolved*, That the financial necessities of the Nation render a tariff for revenue purposes indispensable, in order to pay our National obligations and preserve our National honor.

2. That in regulating duties on imports, Congress should exempt such articles of general necessity as are not produced in this country; and should so adjust duties on other articles as to give fair and just protection, as far as practicable, to all products of American industry.

3. That, considering the compact, extensive and persistent efforts of the Free Trade interest, to destroy American industry, and weaken our National resources, it is the duty of all the industrial interests of the Nation to unite in a common effort to counteract this foreign Free Trade policy.

4. That we regard the present duties on wool and woollen goods as well adapted to promote and harmonize the true interests of producers and consumers of wool and woollen goods; we therefore have full faith in the ultimate results of this tariff, and protest against its being either modified or repealed, until time shall fully demonstrate its effects.

5. That the interests of the woolen manufacturers and of the wool-growers being recognized as identical, further measures should be adopted to make each class familiar with the wants and necessities of the other; and that the efforts made within the past year to increase the manufacture of wool in our county, should meet the approval of the wool-growers.

6. That the standard adopted by some of our wool-buyers, in buying wool, by making a certain number of pounds that a fleece shall weigh the rule for shrinkage, is detrimental to the best interests of both the manufacturer and the wool-grower; and as a natural result leads to fraud and deception; and that wool should be sold by the pound, and according to the condition and quality of the same, as grain or other commodities; and until that rule is adopted, or the wool-grower can deal directly with the manufacturer, there must, as a natural consequence, be hard feelings between incompetent buyers and wool-growers.

7. That until the wool-growers build or have some proper place where they can have their wool properly assorted and graded, and can deal directly with the manufacturer, there is but little prospect of their getting the full value for their wool.

8. That we look upon the slaughter and destruction of sheep, as practiced by some, this fall and winter, and also the anxiety of some farmers to dispose of their flocks at any price that may be offered them, as detrimental to their own best interests and to those of the county, as a wanton destruction of productive capital, and wholly uncalled for, in view of the future bright and prosperous aspects of the wool-growing business.

D. H. STONE,  
CHARLES PETTIS,  
R. W. DULLAM,

*Committee.*

*Officers of the Association for 1868.*—Charles Pettis, President; F. H. Rankin, Secretary; Oren Stone, Treasurer; with an Executive Committee of seven members.

## HILLSDALE COUNTY.

The President, H. B. Tucker, and the Secretary, F. M. Holloway, of the Hillsdale County Agricultural Society, make an interesting statement of the doings of the Society, together with the general results of agricultural operations in the county for the year 1867, as follows:

We regret the necessity of reporting for the agriculture of this county, an unpropitious year. Our material interests have suffered from one of the most protracted droughts experienced since the country was settled, which, with the visitation of the wheat midge, has left a mark that will require time to efface.

## FRUIT.

Our fruit interest is becoming a very important one. *Apples* were very abundant, but owing to the dry weather of the autumn, they matured imperfectly, and are small and perishable. *Peaches* were abundant for home consumption, but for the uncertainty of the crop, farmers have neglected to keep their orchards fully set. *Pears* are being very extensively cultivated, and with marked success. The same remark will apply to *Grapes* and smaller fruits, generally.

## STOCK.

*Cattle*.—Our farmers are awake to the improvement of their cattle, and steady progress is being made in this branch of husbandry. We think we are justified in saying that Hillsdale county can produce as good herds as any county in the State. Messrs. Curtis & Sons, the noted breeders of Short-horns, known throughout the State, make large sales in the county, at reasonable figures, so that the benefits of the stock are within reach of all.

*Horses*.—We have but few horses designed for the turf, or track only; but our horses are a very desirable class—a medium between the heavy draft-horse and the pony; a strain generally of the Black Hawk on the Messenger, or Duroc; good roadsters, and equally suitable for the plough; for it will be borne

in mind that we have very little of those hard clayey soils in the county that are found in some parts of the State.

*Sheep.*—Notwithstanding the great depression in the price of wool, there is a steady improvement in the flocks of the county. Very many have been largely culled, and the probability is that the clip of 1868 will fall under the one of '67. Yet there will be an improvement in quality. The coarse and rough, as well as the excessively greasy and yolky, will largely disappear. The last has been marketed mostly at about 40 cts. per pound. I have no means of ascertaining the amount.

*Hogs.*—Of hogs the supply is large, and the quality good. The prevailing breeds are the Chester-White, and this crossed on the common stock. Many are, however, inquiring after the Essex, as being more desirable from their tendency to fatten early, and their quiet disposition. They were once quite extensively raised in this county, but gave way in many instances for the Chester-White. There are, however, a few left that have been carefully bred, and are pure.

#### THE DAIRY.

Of the dairy, we are unable to speak very flatteringly in reference to the past, but hope in the future to report favorably on this important branch. Some of the prominent farmers of the township of Reading, among whom we may mention Col. F. Fowler, John Fitzsimmons, Daniel Kinne, and others, have in course of erection a cheese-factory, with a capacity for the milk of a thousand cows, and the business will be thoroughly tested as a source of profit or loss.

#### MANUFACTURES.

In this branch of industry we probably fall short of many other counties in the State, and we attribute the cause to the fact that we have but little water-power. This county being the source of most of the rivers of the State, they are not large enough for practical purposes before they leave us. We are not without our machine-shops, however, for nearly our

home supply of carriages, farm implements, furniture, &c. Besides, we have probably the best woolen factory in the State, propelled by steam—that of Messrs. Gardner & Co., of Jonesville. As manufacturers of fine cassimeres and flannels, they have gained not only a State, but a United States reputation for their fabrics.

#### **SHEEP-SHEARING.**

The Society made provisions for a sheep-shearing on an extended scale, to be held on the 12th of May; but when the day came it brought with it an excessive rain, and the grounds were not opened. It was adjourned to the 30th, which brought a fair exhibition of sheep, fine competition in shearing, but no profit to the Society.

#### **HORSE-TROTTING.**

To accommodate all interests, the Society also made provisions for a trial of trotting on their course, July 4th, for horses in and out of the county, with premiums of \$300 and over. This was attended with active competition, and good time made; but the result was not flattering, as the day was evidently designed for better purposes, judging from the result, which left the Society minus one hundred dollars.

#### **COUNTY EXHIBITION.**

This was all the Society could reasonably expect or hope for. The stock department was well filled, and was of superior quality. The mechanical department was likewise well filled, save in farm implements. The fruit department was never so good—but very little short of the State show. Vegetables and grains were well represented; and Floral Hall, embracing the handicraft of the fair sex, &c., spoke loudly in favor of our motto, "Excelsior."

We give the number of entries made in the several classes, to show that the citizens of the county are taking a very general interest in the prosperity of the Society.

Of cattle there were 60 entries; horses, 175; sheep, 94 pens; swine, 13 entries of pens; poultry, 35 coops; farm, barn and house

implements, 85 entries; butter, cheese, bread, honey, wine and canned fruit, 9; green fruit, 129; grain and vegetables, 60; domestic manufactures, wool, cotton and linen, 87; needle work and embroidery, 82; natural flowers, 10; paintings and musical instruments, 58; making a total of 977 entries, of which number, premiums were awarded on 450, to the aggregate amount of \$700. To this, add the amount of premiums paid for sheep-shearing and horse-trotting, \$294 99, and we have the sum of \$994 99 awarded and paid in premiums for the year.

## RECEIPTS.

Our receipts for the year, were..... \$2,134 40

## EXPENDITURES.

On land contract,.....	\$118 85
Building, stables, judges stand, &c.,.....	487 27
Making drives, setting trees, grading and work on track,.....	145 00
Repairing Hall,.....	50 00
Improvements in Hall,.....	40 35
Lumber purchased, now on hand,.....	50 00
Insurance,.....	31 25
Paid principal on Floral Hall bonds,.....	41 43
“ back dividend and interest for 1867 on Floral Hall bonds,	50 46
“ printing for the year,.....	104 50
“ expenses of exhibition,.....	280 25
“ Secretary's salary,.....	100 00
“ premiums for the year,.....	994 99
Total,.....	<u>\$2,694 15</u>

Our indebtedness on land is \$800; on Floral Hall bonds, payable by October 1st, 1872, \$1,570 09.

*Officers for 1868.* — Goodwin Howard, President; Bani Bishop, Vice President; F. M. Holloway, Secretary; Daniel Beebe, Treasurer, with an Executive Committee consisting of eighteen members.

## IONIA COUNTY.

The Ionia County Agricultural Society held its Eleventh Annual Exhibition on the grounds of the Society, at Ionia, on the

2d and 3d of October, 1867. The finances of the Society are stated as follows:

#### RECEIPTS.

Cash on hand from last year,.....	\$63 35
Receipts from Annual Exhibition,.....	490 50
Rent of Society's grounds,.....	35 00
	<u>\$588 85</u>

#### EXPENDITURES.

Expenses of Annual Exhibition,.....	\$205 68
Premiums awarded,.....	245 25
	<u>450 93</u>
Balance on hand,.....	<u>\$137 92</u>

At the annual meeting held on the 14th of January, 1868, the Treasurer reported a balance in his hands of \$183 20, from which it is inferred that \$45 28 of the amount awarded in premiums was not claimed.

The Society has resolved to sell its present show grounds, and to purchase twenty acres on the north bank of the Grand river, near Ionia, where it is expected the next exhibition will be held.

*Officers for 1868.*—J. B. Hutchins, President; W. D. Arnold, Secretary; J. W. Loomis, Treasurer; with a Board of five Directors.

### KALAMAZOO COUNTY.

The Secretary of the Kalamazoo County Agricultural Society, Frank Little, writes that the Society held no exhibition in 1867. He says: "I will not say that our Society is *dead*, but it certainly *sleepeth*, and will continue to sleep till the farmers of Kalamazoo county become more fully awake to their true interests in this matter."

### KENT COUNTY.

The Secretary of the Kent County Agricultural Society for 1867, says:

"This Society, under the indefatigable labors of its President, W. P. Mills, has expended in improvements on its grounds nearly two thousand dollars within the past year; it has erected a very fine building for a floral hall, costing nearly fifteen hundred dollars, the want of which has long been felt, and now, since we have it, it really seems to be a *sine qua non*. The track has also been very much improved, which will add much to the pleasure of the horses that may 'swing around the circle,' if not to their owners. This Society has met with a small loss since the last exhibition; our cattle-sheds and barn, with about five tons of hay, have been destroyed by fire; total loss—no insurance. We now have a policy on floral and mechanic halls, for nineteen hundred dollars, running three years, and we advise all agricultural societies having buildings, to keep them insured. With thirty-five acres of choice land adjoining the city of Grand Rapids, worth with its present improvements, at least two hundred dollars per acre, an efficient corps of officers, and nearly free from debt, as in the past, so we trust in the future, that the Kent County Agricultural Society will be second to none in the State."

The financial exhibit of the Society is as follows:

## RECEIPTS.

Received from former Treasurer, .....	\$ 38 00
Two life memberships, .....	20 00
W. R. Cady, rent of ground, .....	100 00
Rent of ground, .....	10 00
M. E. Church and swing, rent of ground, .....	61 25
County Treasurer, .....	165 84
Gate and membership-tickets, .....	1,462 85
Special premium from Thomas D. Gilbert, .....	100 00
Publishing cards in prem. list, .....	129 00
Total, .....	<u>\$ 2,086 94</u>

## EXPENDITURES.

Paid premiums and Secretary for last year, .....	\$ 77 25
Printing bill last year, .....	19 50
Tax of 1866 and highway tax of 1867, .....	26 59
Floral Hall, \$1,445; extra work, \$30, .....	1,475 00



Lumber, .....	\$109 80
Pump to D. M. Crosby, .....	30 00
Labor and police, .....	63 25
Printing 2,000 premium lists, .....	90 00
Printing and badges, .....	22 08
Incidentals, .....	27 95
Counterfeit money taken at Fair, .....	4 50
Insurance of buildings, .....	58 50
Premiums awarded, .....	652 75
Total, .....	<u>\$ 2,677 67</u>

*Officers for 1868.*—L. S. Scranton, President; M. Freeman, Secretary; John Porter, Treasurer; with an Executive Committee consisting of five members.

#### LAPEER COUNTY.

The Secretary of the Lapeer County Agricultural Society, R. G. Hart, of Lapeer, writes:

"Our Society held its Tenth Annual Exhibition September 25th-27th, 1868. Much dissatisfaction was expressed on account of doing away with family tickets, and obliging every person to purchase a single ticket. But our receipts were very satisfactory, nevertheless, and the exhibition was good."

*Officers for 1868.*—E. A. Brownell, President; William Hemingway, Gardner Dexter, Vice-Presidents; R. G. Hart, Secretary.

#### LENAWEE COUNTY.

The Secretary of the Lenawee County Agricultural Society, J. I. Knapp, of Adrian, writes, under date of November 30th, 1867, as follows:

"Our Society offered a premium list of \$2,000, of which about \$1,500 was awarded in the various classes. The total receipts of the Society for the year will amount to \$3,000. When

I make out my Annual Report I will send you a copy, which will give a more extended statement."

The report alluded to was not received.

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### LIVINGSTON COUNTY.

The Secretary of the Livingston County Agricultural Society, Albert Tooley, of Genoa, writes, that the Fifteenth Annual Exhibition of this Association was held at Howell, on the 9th to the 12th of October, 1867. The weather was unfavorable, but notwithstanding this the entries were more numerous than at any former exhibition, and the receipts were about \$950. All the stock classes were good. Wm. Placeway, of Hamburg, the Messrs. Crouse, of Hartland, K. W. Bingham, of Green Oak, and Mr. Bachelor, of Oceola, were the principal exhibitors of Short-horned cattle. The exhibitors of Devons were John Lillers, of Deerfield, and John E. Dorn, of Howell. All the stock entered by these men, and much other stock that was on the ground, is said to have been such as would have done credit to a State show, and gave evidence that Livingston county has made rapid progress in the right direction.

Horses were not as numerous as usual, owing to the rainy weather. There was a fine show of sheep, of which the principal exhibitors were Wm. Ball, of Hamburg, F. Monroe, and F. Munson, of Howell, M. F. Hillman, of Tyrone, J. M. LaRue, and Thos. Gilks, of Putnam, and Wm. H. Gilks, of Marion. LaRue & Wardrop exhibited a splendid Spanish merino ram, valued at \$1,500. G. Love, of Marion, exhibited some very fine Shropshire Downes.

Floral Hall was well filled with articles manufactured by the ladies of the county. In fruit there was a large display. Joseph Brown, of Marion, had forty-one varieties of apples. Other farmers exhibited many kinds. Giles Ross, of Hartland, had on exhibition ten varieties of pears, and five varieties of grapes, all of which were hard to beat. There was a good show of farm implements, and the most valuable property, in the

aggregate, that was ever brought out at one exhibition in the county.

#### PREMIUM CROPS.

The following is a statement in reference to crops of Indian corn and potatoes entered by J. A. & L. Meyers:

The soil consists of gravelly loam, but, as is usual in this section, it is of a lighter or heavier nature in different parts of the field, though on the whole very well adapted to the production of Indian corn, and favorable to a healthy growth of potatoes.

We planted this season about twenty-eight acres of corn on sod ground, ploughed in the spring, between six and seven inches deep; harrowed thoroughly twice over; after which it was marked one way, eight feet apart, and planted the way it was marked, from two to three feet apart in the rows. It was cultivated with a two-horse cultivator; one man doing all the work, and it did not keep him busy half the time. It was cultivated four times, and we did not have [to hoe] more than two acres of the whole field, in patches where it was the most weedy.

The average harvested was nearly ninety bushels of ears per acre in the whole field. We are well aware that this is not quite as good a yield as might be got by planting in the usual way—hills four feet apart each way; but the greater facility and advantage of sowing wheat on such corn-ground will, in our opinion, more than make up for a slightly smaller yield of corn.

The ten acres entered for competition were the last ten acres husked, and yielded 908 bushels of ears of corn. The one entered was one of the ten, and yielded 117 bushels of ears.

From the half-acre of potatoes, which was taken from the patch of three acres, and was a part of the field planted to corn, we dug 105 bushels of good, sound potatoes of the peach-blow variety. The ground was prepared as for the corn, and marked in rows four feet apart. The potatoes planted were the smallest we had. They were planted just before planting

corn—about the 20th of May. When the potatoes were up they were tended with no other implement than the cultivator above mentioned.

J. A. & L. MEYERS.

We, the undersigned, certify that the above statements are correct; that we helped gather and measure the 908 bushels of ears of corn from ten acres, and 117 bushels of ears of corn from one acre, and 105 bushels of potatoes from half an acre; also that we measured the ground on which the crops were raised.

L. E. ENLER,  
F. STEINACHER.

*Officers for 1868.*—Francis Monroe, President; Albert Tooley, Secretary; L. C. Smith, Treasurer; with a Board of five Directors.

The address before this Society at the Annual Exhibition, was delivered by Prof. R. C. Kedzie, of the Michigan State Agricultural College. It was on the subject of "The influence of Forest Trees on Agriculture," and as it comprised much matter that is particularly deserving of the attention of the farmers of Michigan, it is herewith given entire:

One prominent characteristic of Americans is their irrepressible spirit of hope. With them it is eminently true that

"Hope springs eternal in the human breast."

They seem to have a chronic conviction in their minds that in the long run everything will come out right, and that no care or forethought is necessary for the future, because somehow all things will come about so as to secure the best interests of this favored land. The prophet who sings in exultant strains

"How beautiful are thy tents, O"—Jonathan!

will receive a favorable hearing as a man of sound and practical ideas; while the Jeremiah who tells of coming disaster, will be regarded as a "boding owl" whose views of life would be improved by better digestion. In consequence of this spirit

of hopefulness, and this aversion to looking on the dark side of the picture, persons called upon to address a popular audience, are tempted to "prophecy smooth things," instead of telling the rugged truths which perhaps the people need to hear.

If I have marked out a different path for the present occasion, and speak of some things which should command the sober and earnest consideration of the farmers of Livingston county, and if I fail to tell you the flattering things which are so easy to say, and so meaningless when said, be assured it is because I wish to accomplish some good which shall outlast the enjoyments of the passing hour.

I propose, therefore, to call your attention to the influence of forest trees on agriculture, and the extent to which the destruction of the forest can be carried without endangering the interests of agriculture and fruit culture in our State; and some reasons why the farmers of this county should give this subject serious consideration. While I plead for the preservation of our noble forest trees, I do not rehearse the old song:

"Woodman, spare that tree,"

for the sentimental reason that in the long ago your friends found shelter and rest beneath its branches, but for the substantial reason that in the long future, these trees will give fruitfulness to your fields, security to your fruits and flocks, health to your families and beauty to your homes.

I called public attention to the influence of forest trees on climate, in a report of the Legislature last winter; and as that report is in the reach of you all, I shall not enter into an extended discussion of the subjects there considered, but will direct your attention to other circumstances bearing on this general subject. Let me crave, in advance, your kind consideration, while I discuss so dry a subject as the meteorology of our State.

The fact that almost the entire surface of our State was originally covered with forests, is worth your thoughtful consideration. If the conditions of vegetable growth in our State were such that stability of organic life was only reached by

permanent forest, instead of prairie or open plain, then we ought to heed this significant hint of nature in regard to the large forest surface to increase the highest development of vegetable life as a whole in a State so constituted. The fact that these forests have cost us no labor or care to obtain them, and that we had more than we wanted, so that we regarded them as a troublesome encumbrance, is no reason why there should be no limit to their destruction. The new settler, indeed, often finds himself overburdened with this wealth of forest growth; the trees cover his grounds; his meadows and cornfields must first be rescued from the possession of these giant old trees which toss their arms in defiance of his puny efforts. The labor of clearing up a new farm and converting the dense forest into smiling fields is very arduous, and it is no wonder that the farmer should come to look upon these heavy forests as an enemy to be hated and exterminated, rather than as a treasure to be guarded and a friend to be cherished. The natural results of this tendency soon became manifest. Too often the farmer only begins to realize how valuable his forest is when it has disappeared under his destroying blows, and in regret he exclaims,

*"How blessings brighten as they take their flight."*

What other States and countries can only secure by planting and rearing with patient toil and long waiting, we have found ready to our hand; and all we need to make our State the most beautiful and lovely land the sun shines upon, is to stop our useless and thoughtless destruction of one of the most beautiful of God's gifts to man.

It should not be forgotten how rapidly these forests are disappearing. By the census report of 1860, Livingston county had 130,473 acres of improved farms, and 123,690 acres unimproved. Undoubtedly much of the surface designated "improved," does not represent "cleared lands," and undoubtedly also, large improvements have been made since 1860. Let the forest lands designated as unimproved farms offset the improvements made since 1860, and how then stands the account

of improved and unimproved lands? Mirabeau estimated that France, whose climate is greatly modified by its proximity to the ocean on one side and the Mediterranean Sea on the other, requires for permanent fruitfulness of the cultivated lands, that 32 per cent. of its surface should be in permanent forest. If the moist climate of France requires that 32 per cent. of its surface should be in permanent forest to insure the fertility of the remainder, would it be too high an estimate to say that the dry climate of Central Michigan—far away from the control of oceanic masses of water—ought to retain 40 per cent. of its surface in forest? If these estimates are correct, how much forest land in Livingston county may be permanently converted into cleared land without injuring the fertility of the county as a whole? Just one-tenth of the area of the entire county. This estimate is made without reference to the fact that a large proportion of the lands kept for forest or woodland, in the county, is openings instead of timbered land.

Nor should it be forgotten how rapidly these forest lands are increasing in value and how soon the timber alone will be many times more valuable than the timber and land both are now. It is probable that if the New England States were to-day clothed with their original forest, the timber alone would bring more money than all the farms and improvements of that highly cultivated and thrifty portion of our country. Yet we are not to infer from this that the destruction of the forest is not necessary, and that the surest road to wealth for any country is to leave the forest an unbroken solitude; nor should we undervalue the hearty energy of those who hewed out of the forest, home, comfort and competence. Fields must be cleared and homes created, and the savagery of nature must yield to the plastic hand of man, even though some incidental loss and waste is the consequence. We must not go into sentimental hysterics because the ploughshare that provides for the golden harvests of autumn must bury the flowers of spring. Yet the habit of destroying our forest trees often becomes a mere passion for destruction, and insists on laying waste when the need

has ceased. Says a late writer, describing the toils and tendencies of pioneer life: "The men who rejoiced over the fall of every tree, are not likely to cherish with sufficient care the remnants of the grand old forests, or to replant on the grounds, cleared with so much labor, the trees necessary for shade, ornament and utility. I have seen a splendid elm, the delight of a whole village, ruthlessly cut down by some border ruffian, whose only thought of trees is to cut them down. But such was our early training. The gladdest sound of our childhood was the crash of falling trees, and mother and children together rushed out of the cabin as each giant fell, to see how the area of vision was extended."

Men so trained in the hardy school of pioneer life sometimes seem to make their catechism read: "The chief end of man is to cut down the trees." Thus they often sweep their fields and lanes and homes as bare of trees as is the Sahara Desert, and call this improvement. Nay, even those places reserved for ornament must still pass under the axe. I know one thrifty village in this State, settled by enterprising Yankees, who while yet living in their log cabins, in the very first year of their settlement, erected and finished in substantial style an Academy building 40 by 60, in order that the blessings of education might be secured to their children, and the sound of the gospel be heard in the forest wilds; and who with an appreciation of the beautiful, reserved five acres in the centre of their village for a public lawn. Yet such a people, so alive to the demands of education, morality and taste, had no thought of preserving the beautiful maples and elms which covered their village lawn; and when, after the ravages of a few years it was found that some trees were still spared, and a thrifty second growth of trees was rapidly springing up, and threatening to convert their partial improvement into a grove, these thrifty Yankees devoted their next holiday to improving the Square, and on the next Fourth of July they cut down the last tree, sapling and bush; and now the only ornament of this "improved square" is a pair of hay scales and plenty of Canada thistles.



But perhaps some may ask why are forests necessary? Is not any portion left in forest so much unproductive capital? And does not a wise economy demand that these unproductive forests should be cleared up as soon as the owner can command the means, and the whole country made productive? These are important questions and should receive answer. If trees are of no service in the economy of nature except to furnish fuel and timber, then any surplus beyond these wants is a useless drawback on the productiveness of any country; "cut it down, why cumbereth it the ground?"

But there are other reasons why forests should be spared, and one is their control over extreme fluctuations in the rain-fall of any region. The researches of modern science, accurate and careful observation, as well as the history of the past, show that a country abounding in forests is more moist, has a more copious and equable rain-fall, abounds more in springs and streams, and in consequence of all these, is more exempt from great and sudden fluctuations in temperature, from late frosts in spring and early frosts in fall. Thus, Egypt, from earliest periods of history has been spoken of as a rainless region; but since Mahomet Ali has made his immense plantations of trees, showers have become frequent. The controlling influence of forests over rain-fall, is also shown by the fact that countries once supplied with forests, and having abundant rains and immunity from frost, their forests being destroyed, have been scourged by drought and frost till the forests were restored, when they once more became fruitful; or, if the inhabitants would not restore their protecting forests, the stern hand of famine threatened to wipe out a race that would not reverence the order of nature. Thus the Cape De Verde Islands, so named from their greenness, have been stripped of their forests by their improvident inhabitants, since which time they suffer terribly from periodical droughts; sometimes no rain falling for three years at a time, and 80,000 inhabitants, or one-third of the population have perished. Thus famine cuts down the inhabitants as pitilessly they cut down the protecting trees. It

has been proposed to replant the forests, yet such is the ignorance and indolence of the inhabitants that little has been done towards restoration, and it is possible that the entire race may be cut off, to be replaced by those who have learned that "the tree of the field is man's life."

But we need not go beyond the border of our own country for proof of the disturbance of climate caused by the extensive destruction of forests. You remember how Ohio was deluged with rain last fall—large districts flooded, vast quantities of corn and other grain washed away; flocks and herds drowned, every railroad leading into Cincinnati submerged save one—while at the same time the New England States were parched and dry. How is it this year? A dispatch from Cincinnati, dated September 27th, says:

"The weather continues dry. Last night the temperature was down to 48°, but it now is 72°. The reports regarding the corn and potato crops are even more discouraging. Farmers are selling off their stock as fast as possible. Water is very scarce, and in many places cattle have to be driven a long distance to water."

A letter from northern Ohio says:

"The pastures are heaps of dust, and an examination of the ground and its contents in a potato patch, would hardly reveal the kind of crop planted."

Says the *Sandusky Register* of September 30th:

"Never before in the memory of the living, has Northern Ohio suffered from such a terrible drought as is now prevailing. For nearly three months, hardly anything to be called a shower has fallen in this part of the Reserve. Everything in the way of foliage is parched, blackened, and covered with dust. Cisterns long since went dry, and now nine-tenths of the wells are nearly exhausted. In some cases cattle were driven six miles to water, and for 19 miles back from the shore people depend upon the lake for water. Last week water was hauled from the lake, at Sandusky, to Bellevue—twenty miles, by railroad, inland. In some localities, water hauled a great distance is sold by the

pail-full, for cooking and washing purposes. The dust fills the air and creeps everywhere. It steals through the crevices of window blinds, and sifts through roofs, covering furniture with a coating of grit, and worrying the life out of house-keepers, who stand, dusting-brush in hand, looking in despair on the strangling flood of dust. The lake alone seems to be unaffected by the prolonged dryness; but if the rain be much longer delayed, we shall expect to hear of vessels aground in the midst of Lake Erie, and yawl boats stranded in mud in our deepest harbors. The great drought reaches from Rochester, New York—in a belt of about 200 miles in width—to central Iowa. Northern Ohio is near the centre of the belt, and suffers accordingly.

“At present there are no prospects of relief. Clouds gather in the heavens, looking like squeezed sponges, frisk about a while, and then disperse, leaving sun-shine and dust. Saturday evening last, the barometer had a hopeful tendency downward, but to-day the mercury has returned to the “fair weather” point, and we remain covered with dust, if not with sack-cloth. Oh, for water! water!”

A dispatch from Elmira, New York, says:

“Pastures are an utter failure, and cows are rapidly drying up on hay, which is fed out to them as though it were mid-winter. The country is parched for water, wells are dry, and the beds of streams, instead of flowing water, show yellow belts of burning sand. It is doubtful, even if rain should come, whether any fall feed could be secured for our flocks, and the prospect is most gloomy.”

Pass on east of the Hudson river, where the drought was “master of the situation” last year, and this year the country is wasted and destroyed by extraordinary floods, the Connecticut river rising ten feet in twenty-four hours, the rain pouring down incessantly for three days and nights, till one wrote that everything was turning into water, and even the clouds had got the drop-sy!

What shall we conclude in regard to such fluctuations and

irregularities in the distribution of the rain-fall? No reasonable person will deny that for all these changed manifestations of natural effects, there has been a corresponding change of natural causes; and it becomes us to inquire whether this derangement has arisen from circumstances within the control of man, and hence capable of a remedy, or whether they arise from causes beyond his control, and to whose effects he must submit with patient endurance, because they are remediless.

The rain-fall of any region is influenced by a variety of causes; the nature and direction of its prevailing winds, the influence of mountain ranges, &c.; but a cause which is very marked in its influence and which is also within the control of man, is forest growth. When we see how rapidly these forests have disappeared under the hand of the woodman, and how steadily the climate of the United States has changed with the disappearance of the forest, have we not good reason to suspect that man's own hand has drawn down these evils upon himself? If by this thoughtless destruction of this barrier against the fickleness of the weather, we have laid ourselves open to the operation of causes whose disastrous effects we are only *beginning* to experience, is it not time to pause and consider whether we have not gone as far in this destructive process as is safe, and whether a wise prudence in regard to the future does not warn us to stay our hand?

Perhaps we shall obtain a better conception of the beneficial actions of forests upon climate by considering the condition of some portions of our country almost entirely deprived of the influence of forests. The prairies of the West are not fair examples, because they are broken by large belts of timber land; but we will take the vast region lying east of the Rocky Mountains, where for hundreds of miles there is not a tree or bush except the wild sage.

The Rev. G. A. Adams, of Perrysburg, Ohio, to whom I had sent a copy of the report on forest trees, wrote me as follows: "I am greatly interested in your report on forest trees and their influence on climate, especially as it explains much that I

saw and experienced on the great plains lying east of the Rocky Mountains. While riding over these vast plains without a tree or bush, the heat by day was almost unendurable, yet the cold at night was excessive, so that we could not sleep unless wrapped in blankets and buffalo robes. This vast region, scorched by the sun by day and chilled by excessive radiation at night, the abode of countless swarms of grasshoppers, can never be the permanent home of civilized man until he can protect himself and mitigate the excesses of the climate by planting trees. It was a question with me whether it was possible to cause trees to grow at all, but as I came upon the bluffs back of Nebraska City, I there found the problem solved, for I there found a vigorous grove formed by planting the locust and cotton-wood, and I then became convinced that these vast and desolate plains would some day be the happy homes of millions yet to be."

Being interested in this subject, I wrote to him to express his views more fully on this subject, and received the following reply: "The trees of which I wrote were back of Nebraska City, fifty miles south of Omaha. In respect to the climate of the plains, it is well known that its aridity is in a great measure owing to the precipitation of moisture of the clouds by the mountains against which they strike. But if trees could be raised along the valleys and where grass now grows, then the climate would be modified. My experience was that in the day I was burned up, and in the night frozen, the treeless wastes being left to the whole power of the sun by day, and to an unrestrained radiation at night.

"I returned from Fort Laramie on horseback, and went directly across the country from Fort Kearney to Nebraska City. The land is very rolling and beautiful in lay, rich in all that a farmer wants, and yet it produces nothing but the short buffalo grass. About fifty miles west of Nebraska City the prairie chickens began to appear, and with them the grass grows to a greater height. This grass indicated the nearness to the Missouri river. On the Missouri bottoms there is plenty of

wood, principally cotton-wood. All the wood I saw growing was on bottom lands, and hence my interest in the nursery of thrifty locusts and cotton-wood, on the bluffs which I passed on approaching Nebraska City. It occurred to me that if they would grow there on that high land, a little effort would carry them back and back gradually towards the plains, and in that case the desert would be redeemed in the change of climate.

"Kansas and Nebraska both lie within the belt of country which suffers most for want of rain. In 1863 it did not rain at Fort Laramie for eight months, and it was dry in Kansas. It cannot be considered an agricultural State on account of its frequent droughts and consequent grasshopper plague—for I consider the grasshoppers a result of the dry climate of the plains. There is not enough rain to drown the rascals. But all this, it seemed to me, might be changed by tree cultivation. Now for my reasons. The belt of timber on the Missouri bottoms affected the grass for fifty miles in the interior, the climate was so changed by the timber belt, that the high rolling lands grew grass sufficiently high to hide the prairie chickens. Of course the volume of the Missouri did something towards this; but the trees served to hold the vapors which arose, and, it may be, helped to diffuse them. The circumstance, then, that trees would grow on the high lands was a fact, it seemed to me, which solved the question of the future of Kansas and Nebraska; for these States are full of small streams, as you will see by consulting a map, and from these streams the forest must radiate—the work of intelligent and prudent men whose business it shall be to make this western desert to bloom as the garden of the Lord.

"I have just indicated the train of thought that was in my mind. It is this: 'Rivers to secure trees, and trees to shade the rivers and diffuse their influence over a rainless land.'"

But there are other evils besides frost and drought which follow in the footsteps of this infraction of the order of nature. These evils are not so evidently caused by the derangement of nature's system as those already enumerated, and hence would

not so readily be traced to their true cause. Perhaps we are only beginning to surmise the true cause of so many blights and disasters which have befallen the farmers and horticulturists. Many instances of deterioration in grains and fruits may possibly be fully understood only when we come to know more fully the relations of forests to climate. Take an example probably familiar to you all. When your orchards first began to bear fruit in this county, your apples were as smooth as "the cheeks of a lassie of sweet sixteen." How is it now? Are your Early Harvests, your Rhode Island Greenings and your Newtown Pippins smooth and waxy, or are they scabbed, cracked and distorted? Yet this scabbed condition of fruit is found to be caused by mildew or blight, which attacks the fruit at any time from its first formation until it is the size of a robin's egg; and this fungus growth is invariably found to attack the fruit after a cold night, in which the thermometer has sunk 20° or 30°, and especially when this sudden reduction of temperature is accompanied by wind. These fungus growths appear as dark-colored spots, which arrest the growth of the apple immediately beneath them, causing it to become distorted, and resulting in the cracking and general scabbiness of the fruit. Trees enclosed by walls or screens of forest trees, and those growing near streams or lakes, when the moist air prevents such sudden and excessive reductions of temperature, are usually free from the scab. When you consider how admirably our State is adapted to the growth of the apple, and what a vast market is opened to us from Lake Michigan to the Rocky Mountains; when we see buyers from New York and New England in our markets, securing our apples for the eastern market, we see how great would be the calamity which would deprive us of the fruits of our orchards. Yet this is only one of the many possible evils which may visit us, if we persist in destroying our protecting forest trees.

But the apple is not the only fruit that needs a protecting screen in this climate; nor the only important crop that demands protection at the hands of the farmer. The protection

of our winter wheat is a matter of so great importance that you will pardon me if I call your especial attention to it. It would be a sad day for Michigan agriculture if we had to give up winter wheat and fall back on spring wheat; yet some of our best wheat-raising counties begin to find winter wheat a precarious crop. Occasionally there is a winter with such an abundant snow-fall that the ground remains covered till well on in the spring, and the wheat comes forth green and strong. But more frequently the snow-fall is scant; the field exposed to the full force of the wind is soon swept bare of all snow, alternate freezing and thawing injure the vitality of the wheat and heave it from the ground, and spring finds it brown and dead, or at the best, capable of but feeble and struggling growth, and summer finds the farmer debating whether to cradle it for a light crop of wheat, or mow it for a heavy crop of weeds.

Hon. J. J. Woodman informs me that the farmers of Van Buren county find that their winter wheat needs protection from the wind to insure a good crop; that a close fence or a strip of woods affords protection; to a strip of considerable width; that feeble barriers are not without their influence; for example, when the wheat is harrowed in and the ground rolled, the crop is very generally a failure unless protected in some way from the wind; that if the wheat is harrowed in and the surface left without rolling, a partial crop is generally secured; but if the wheat is ploughed in with gang-ploughs, the furrows running north and south, a good crop is almost certain, but if the furrows run east and west, the crop is less sure. This shows how important is the influence of comparatively trivial causes. Where the ground is deprived of every barrier against the wind, the frost penetrates to a greater depth, and its action upon anything at the surface is much more severe. The snow, which should serve as a screen from the severe cold, is not permitted to lie upon the surface of a perfectly smooth field where the wind is unrestrained; it is swept away from most of the surface and heaped up in heavy drifts at certain points, or it is evaporated entirely in our dry winter winds. In this way the



great mass of the surface loses entirely the protecting influence of the snow. All of you have noticed the striking contrast in the appearance of different parts of your wheat-fields in the spring; the fresh and vigorous greenness of those parts properly covered with snow, and the brown and withered appearance of those parts left exposed to the rude touch of frost and wind. Even the slight obstruction of furrows running across the direction of the wind affords a lodging place for the snow, and this slight protection often makes all the difference between a good crop and no crop at all.

The two evils which most seriously threaten the agriculture of our State are drought and cold. Our State lies on the meridian line of greatest cold on the western continent. Look at any meteorological chart, and you will see that the lines of equal temperature take a fearful sweep southward on our meridian line. Thus, for the months of December, January, February, March and April, according to Prof. Dove, we have the average temperature of our newly acquired Russian possessions, or the same temperature for five months in the year as that of a country North of us by  $17^{\circ}$  of latitude; and it is only in May that we begin to have the climate belonging to our latitude. Think of the contrast between our climate and that of southern France and Italy—the land of the vine and the olive; yet they are in the same latitude as Michigan. Our rain-fall, which ought to be 40 inches a year, is only 28. These facts show what are the evils against which we ought to guard ourselves with special care.

No one will doubt that the partial removal of our forests has increased the force of our winds, and that a further removal will still more increase their violence. Let us see what will be the influence of this cause alone, leaving out of the account the known influence of forests in gathering clouds and producing rain, as well as preserving the rain which falls, so that it may slowly reappear in springs and small streams.

Every person has noticed how greatly evaporation is accelerated by a brisk wind, and how rapidly a heavy rain-fall is dried

up by the wind. Evaporation is often doubled, and sometimes quadrupled by a brisk wind. If, then, the country is opened up more fully to the sweep of the wind, one effect will be a dryer climate, from this increase of evaporation. If the same amount of rain should fall, yet the country would be practically dryer, because the ground would be so much more speedily dried in the wind. But evaporation is also a cooling process, and the more rapid the evaporation, the greater is the reduction of temperature. Let any one hold his hands in a brisk breeze for a few moments, one hand wet and the other dry, and the chilliness of the wet hand will soon convince him that evaporation often reduces the temperature of a wet body ten degrees, and sometimes fifteen degrees below the temperature of the surrounding air. We see, therefore, that the removal of our forests merely by increasing the force and frequency of our winds, will have a deteriorating influence on our climate, both in respect to temperature and moisture.

But there are special reasons why the farmers of Livingston county, and the counties bordering on it, should guard themselves from these deteriorating influences. The climate of many portions of our State is undoubtedly greatly ameliorated by the magnificent chain of lakes that surround us on three sides. The climate on the eastern shore of Lake Michigan is known to be remarkably in contrast with that on its western shore. It is undoubtedly true that the climate of the State, as a whole, is very favorably affected by these large bodies of water. While this is true, it is equally true that the central portion of the lower peninsula fails to receive the special and marked benefit of this lake climate. Cast your eye on the map and you will see that the south-west wind, which is our prevailing wind, has played over a vast extent of country unbroken by any large body of water, for it comes to Livingston county without having passed over any portion of Lake Michigan. It has been stated that evaporation from a land surface is only one-tenth of that from a water surface; and this south-west wind, therefore, comes to us as a dry wind. From whence

comes this wind? Far away to the south-west there stretches out a vast, treeless, and comparatively dry tract, embracing the naked plains of northern Texas, New Mexico, Utah and Colorado. This used to be called the Great American Desert. While it is far from being a desert it is remarkably destitute of water, as is shown from the small number of streams flowing from it. In consequence of the dry atmosphere of this region, the summer and autumn are characterized by great heat by day and excessive cold by night. Thus Captain Beckworth, in his narration of the survey of the Pacific Railway, says: "We observed the greatest contrasts between the heat of the day and of the night in these mountain valleys; from noon to 3 p. m. the thermometer standing at 87° to 90°, and at night falling below the freezing point."

In consequence of these cold and frosty nights, caused by this dry condition of the atmosphere, it is found very difficult to raise Indian corn in Utah, although it lies in the latitude of Virginia.

From this vast region, marked by such violent extremes of temperature, and characterized by such atmospheric dryness, comes our chief wind, and it reaches us without traversing a single body of water of any size. Consider how different the influence of this wind, if instead of traversing this dry and parched region, it flowed over a warm inland sea. Think how different the climate of Northern Illinois, Wisconsin and Michigan would be, if northern Texas, New Mexico, Utah and Colorado were a warm sea, like the Gulf of Mexico, and sent to us the warm and moist winds, such as the Gulf stream pours on Kentucky and Southern Ohio.

But you will say there is no hope of converting Utah, New Mexico, or Colorado, into an inland sea, and thus washing out the stain of polygamy, quenching the fires of Indian war, and at the same time improving our climate. Very true. The "water cure" is hopeless to cure this evil. But I call your attention to this subject to show you that for this very reason the farmers of Livingston county should protect themselves

from the destructive sweep of this south-west wind. If the farmers lying under the lee of Lake Michigan can afford to cut down and waste their forests because they are exempt from the worst effects of this wind, the farmers of this county cannot afford to open up their farms to the sweep of this pitiless wind, bringing on its wings consuming drought by day and cutting frosts by night. You may say that these are fanciful evils; that scientific men are always alarmists. I ask if the droughts of 1864 and 1867, and the frosts of the same years, are fanciful evils? Are not drought and frost on one hand, and excessively wet seasons on the other, becoming more frequent as the country becomes cleared up? Do not these facts show that the balance by which nature conducts these climatic excesses has been disturbed by the removal of our forest? We have heard so often of these counties as "new," "unimproved," "in the woods," &c., that we do not stop to inquire whether the relative proportion of forest land and cleared land has not already been reached. I do not say that the limit to which removal of the forest should be allowed is reached already, but I do say that for all this region the limit is so nearly reached that we ought to see that sufficient forest surface is reserved, that needless destruction should cease, and that we ought to so plan and arrange our permanent forests as to secure as complete protection against the winds as possible.

Whatever is done for the preservation of our forests, and thus mitigating the fluctuations of temperature and moisture, and restraining the action of the winds, must be done speedily. Destruction is swift, but reparation is slow. To cut down a stately tree is the work of an hour; to replace it is the work of a century. To save the trees necessary for safety, comfort and beauty, requires only a little thoughtful care, and almost no effort; to replace them after they are once destroyed will require the labor of generations.

Another consideration is that the best results can be secured only by concerted action over a large extent of country. If the inhabitants of one township preserve all the trees necessary for

their locality, while surrounding townships waste and destroy their forests, the provident township will reap only a part of the benefit which it would receive if all that section took the same wise course. Indeed, a single farm imprudently and recklessly managed may become the scourge of a whole neighborhood.

Let me also call your attention to shade by the roadside. Many persons seem to think that a good road cannot be made unless it is first laid bare to the full influence of sun and wind, and hence the first necessity is to cut away all trees from the road-bed, and from the road-side also. When proper drainage of the road-side is not secured, cutting away the trees and letting in the sun and wind to promote evaporation, will to a certain extent, supply the want of drains. But when good drainage is secured, it is seldom necessary to cut away all the trees from the road-side, unless it is upon very stiff clay lands. But roads running through light, sandy soils are not benefited by cutting away all the trees, but on the other hand they are greatly injured thereby; they become in summer a bed of deep, shifting sand, most wearisome to both man and beast, while the clouds of dust, and the hot rays of the sun serve to increase the discomfort. In the winter such a road is at the mercy of every wind that blows; the drifting snow and shifting sand are nature's suggestive hints that some screen or wind-break is needed there. How much better such roads would be, merely considered as roads, with sufficient shade trees to keep the ground comparatively moist, and to keep firm the otherwise movable sand in the road-bed, as well as to prevent the drifting action of the wind on the sand and snow. How much more grateful and invigorating to the traveler and his toiling beast is the shade thus afforded. But when we consider how greatly any region is benefited by barriers against the wind, and how much may be done by lining the roadside with trees, while the road itself is benefited thereby, and the beauty of the country greatly increased, we are astonished at the vandalism which cuts down every tree in the limits of the highway.

I beseech you, let the comfort of the traveler, the ease of his team, the benefit of the country and beauty of the landscape, have some consideration, as well as the question of how most easily to construct a dry road-bed.

Let me ask you, in conclusion, is not the subject justly entitled to the sober consideration of the farmers of your county? Should not public attention be aroused and directed to this important subject? Much may be done by discussion through the public press, and otherwise, and thus create a healthy public sentiment. Much may be done through your organization as an Agricultural Society. Instead of premiums for fast horses, offer premiums for the farm which is best provided with needful shade for the house and farm buildings, the front yard, the lanes and road; for pastures in which the comfort of the dumb beast is not forgotten; for the best wind-break against the prevailing wind, whether formed by natural forest growth, preserved and protected, or by planting groves. In all these ways much may be done, and that speedily, if we would secure the best results with the least cost.

If by the discussion of this subject the farmers of this county shall be induced to look upon the trees, not as foes, to be destroyed, but as friends to be cherished, to adorn their homes and grounds with our health-giving and beauty-giving trees, to bless the weary traveler with grateful shade by the highway, to consult the comfort of the flocks, and their own profit, by plentiful shade trees in their pastures, and finally, to guard as effectually as possible against the sweep of destructive winds, by preserving or planting wind-breaks of forest trees—then this labor has not been spent in vain.

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#### OAKLAND COUNTY.

The Secretary of the Oakland County Agricultural Society, George W. Brock, writes that this Society offered a premium list for 1867, comprising the amount of \$3,000. On the 19th

to 21st of June, the Society held an exhibition of horses on its grounds at Pontiac, for which premiums to the amount of \$1,000 were offered. The weather was fine, the entries numerous, and the exhibition was successful in every particular. The gross receipts were \$1,650.

The Nineteenth Annual Exhibition of the society was held on the 9th to 11th of October. It rained during the entire exhibition, and defeated, to a considerable extent, its success. Nevertheless, the entries amounted to about 1,200, and the total receipts were \$2,838 68. The entries in the classes of horses and cattle were more numerous than in any preceding year. The display of horses, fat cattle and blood stock of all kinds, has been rarely excelled.

The society has made many improvements upon its grounds, including a tenant house for the keeper of the grounds, at a cost of \$1,200.

The society has formerly acted as a voluntary association, having no legal existence. On the 10th of April, 1867, the officers met and organized themselves into a body corporate, by adopting articles of association, and elected a Board of Directors, as follows: Lysander Woodward, H. E. DeGarmo, Wm. Satterlee, Wm. S. Hadley, L. W. Simmons, D. A. Wright, Geo. Bloomburg, Austin R. Kimmis, Geo. Reeves, C. R. Carpenter.

The Society has much improved its condition during the past year, financially, and now have commodious buildings, and one of the finest half-mile tracks in the State. Some additional buildings are still needed for exhibition purposes.

*Officers for 1868.*—Lysander Woodward, President; E. B. Comstock, Treasurer; Geo. W. Brock, Secretary, with Vice Presidents and a Board of ten Directors.

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#### ST. JOSEPH COUNTY.

The Secretary of the St. Joseph County Agricultural Society, Wm. McCormick, states that the Seventeenth Annual Exhibition was held on the grounds of the Society at Centreville, on

the 25th to 27th days of September, 1867. The exhibition was far better than any previous one held by the Society, and the attendance much larger. Premiums were offered to the amount of \$1,400, and were awarded to the amount of \$846. There were 43 entries of cattle (double the usual number), among which were three pairs of twin steers. The premiums offered on cattle amounted to \$274.

The following statement shows the financial condition of the Society:

## RECEIPTS.

Amount on hand, Dec. 8, 1868 (end of fiscal year),.....	\$554 50
Receipts at Annual Fair in 1867,.....	1,744 25
For use of grounds, &c.,.....	31 33
	<u>\$2,330 08</u>

## EXPENDITURES.

Improvements on grounds and expenses during the year,.....	\$780 26
Premiums awarded at the Annual Fair,.....	846 25
On hand at annual meeting, Dec. 14th, 1867,.....	703 57
	<u>\$2,330 08</u>

*Officers for 1868.*—J. H. Gardner, President; L. A. Clapp, Secretary; Edmund Stearns, Treasurer, with a Board of five Directors.

## TUSCOLA COUNTY.

The Secretary of the Tuscola County Agricultural Society, J. D. Lewis, of Vassar, gives an encouraging account of this newly-organized association, and its First and Second Annual Exhibitions, as follows:

The Society was organized agreeably to the provisions of law, January 8th, 1866, and a Constitution was adopted, officers were elected, grounds procured and fenced in a substantial manner, and buildings, of rather an inferior character, erected thereon for the protection and exhibition of articles. A premium list was prepared and published, offering about \$800 in premiums. The first exhibition was held on the grounds at



## WASHTENAW COUNTY.

The President of the Washtenaw County Agricultural and Horticultural Society, H. Arnold, writes that the Nineteenth Annual Exhibition was held on the grounds of the Society at Ann Arbor, October 2d to 4th, 1867. It proved pecuniarily successful, the receipts at the gates reaching the sum of \$1,732, which with the mill-tax raised by the Supervisors of the county, \$300, reaches an aggregate of \$2,032. Out of this sum have been paid premiums to the amount of \$847, and \$820 have been expended in building a suitable dwelling-house on the grounds of the Society. There have also been expenditures to a considerable amount in smoothing the grounds and erecting suitable stands and seats for spectators.

The financial affairs of the Society are in a highly prosperous condition. The cattle brought out at the last exhibition were not as numerous as at some former exhibitions, but were of very superior quality. The rapid improvement that has been made in horses was quite noticeable. A similar remark is applicable to sheep, of which many exhibited here were not inferior to any at the State Exhibition.

The crops of the county suffered from the long-continued drought. Indian corn and potatoes yielded quite an average on sandy and gravelly soil. The heavy soils yielded but a meagre return for the labor bestowed. Hops are beginning to be raised in the county to a large extent, although this year they have been nearly a total failure, on account of the ravages of an insect (the hop louse), against which no effectual remedy has been found.

*Officers for 1868.*—Calvin Wheeler, President; Nelson M. Schoff, Recording Secretary; Lorenzo Davis, Corresponding Secretary; John T. Swathel, Treasurer; with an Executive Committee of six members.

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REGISTER OF  
METEOROLOGICAL OBSERVATIONS,

FOR THE YEAR 1867,

TAKEN AT THE

*State Agricultural College of Michigan,*

BY R. C. KEDZIE,

Professor of Chemistry.

LATITUDE  $42^{\circ} 42' 24''$ ; LONGITUDE,  $7^{\circ} 33' 19''$  WEST OF WASHINGTON.

Height above the Sea, 895 Feet.

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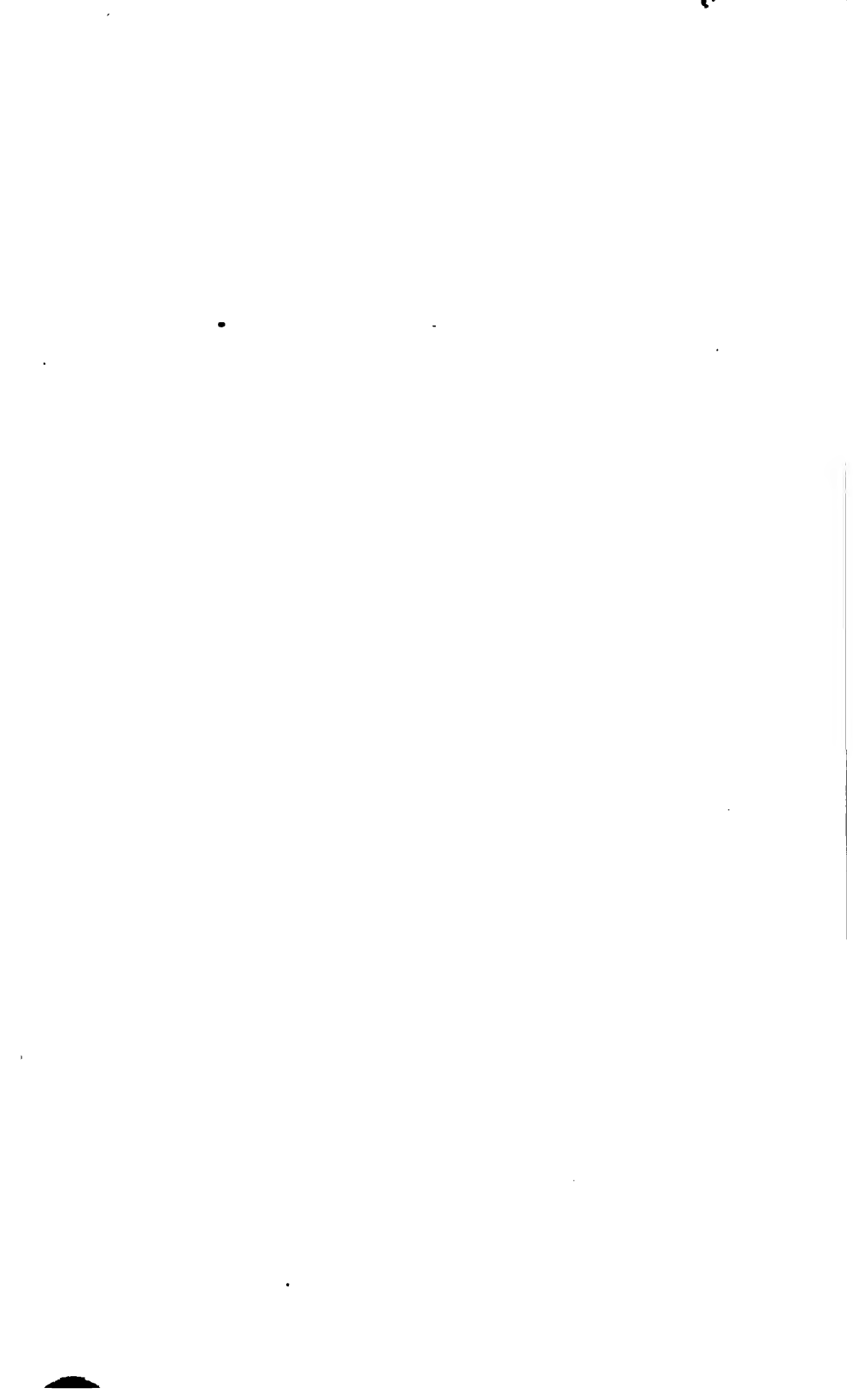
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Height above the Sea, 895 Feet.

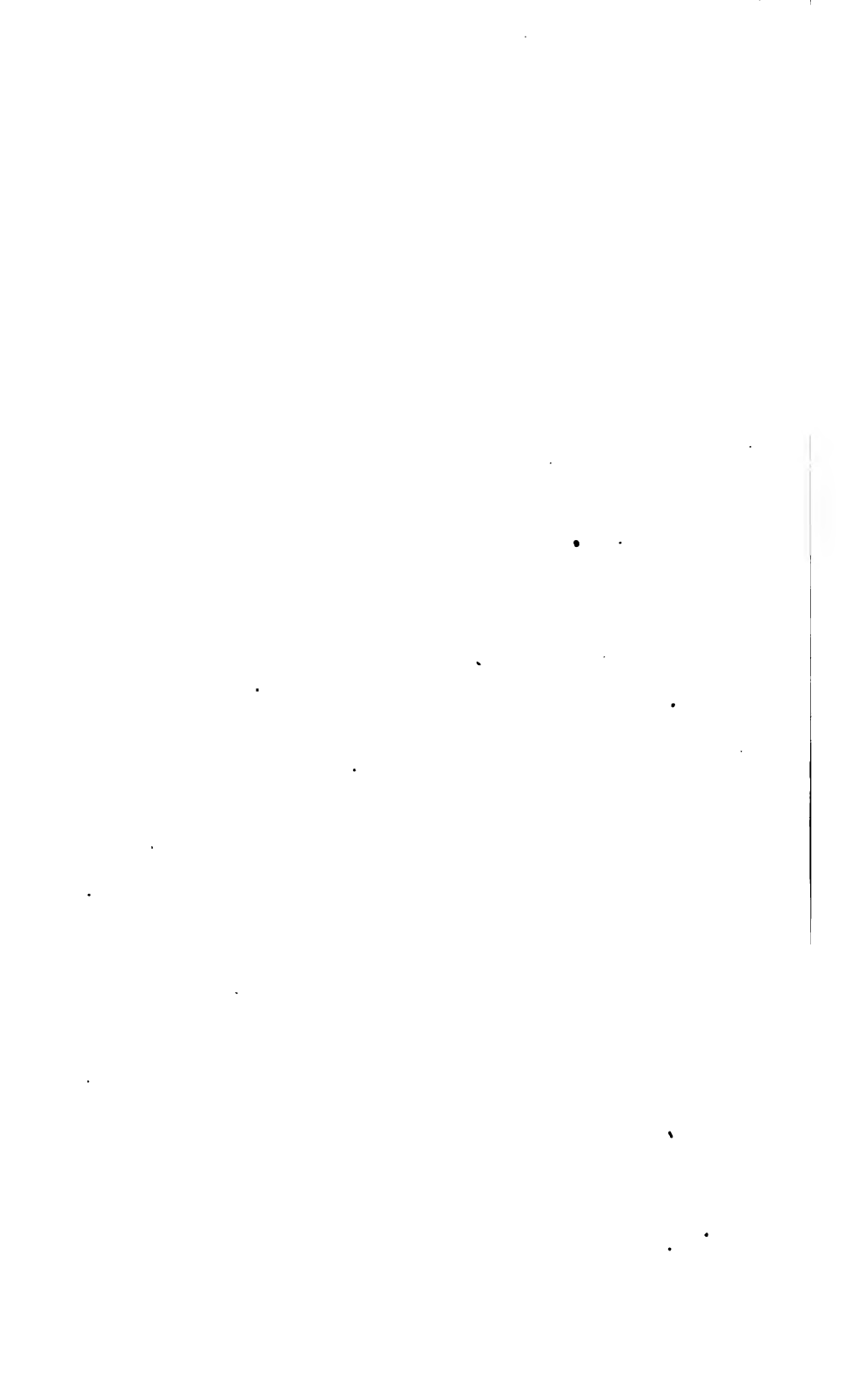
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# OF JANUARY, 1867.

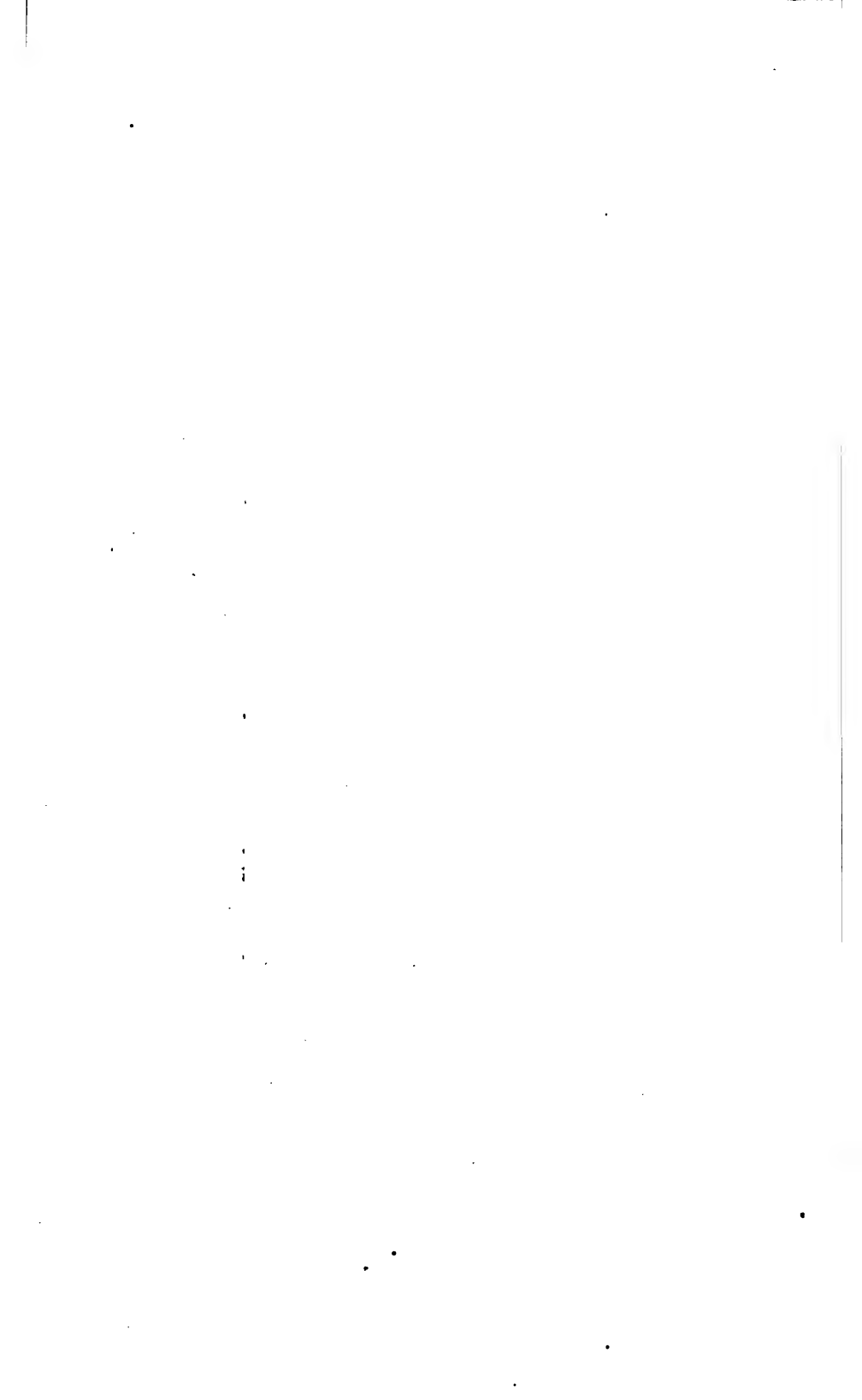
Day of Month. Bar. reduced.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
0	29.172	29.194	29.241	29.202	.029	.082	.041	51	84	74
0	29.180	29.047	28.996	29.041	.045	.071	.042	76	69	59
3	28.978	28.924	28.985	28.945	.084	.082	.065	54	84	42
1	28.885	28.879	28.789	28.844	.111	.155	.111	75	79	67
0	28.545	28.417	28.538	28.466	.142	.162	.118	88	89	68
1	28.620	28.746	28.901	28.789	.084	.117	.094	71	76	73
8	28.953	28.946	28.743	28.880	.067	.117	.075	81	87	100
5	28.611	28.608	28.755	28.688	.091	.117	.123	85	76	87
9	28.653	28.570	28.462	28.561	.108	.125	.106	100	69	86
6	28.448	28.413	28.477	28.446	.075	.076	.071	100	52	69
10	28.681	28.757	28.938	28.776	.071	.084	.082	100	71	100
1	29.156	29.104	28.983	29.101	.036	.059	.108	100	40	100
8	28.627	28.642	28.694	28.654	.103	.141	.129	100	100	100
6	28.822	28.881	28.821	28.848	.068	.141	.091	100	100	85
1	28.960	28.979	28.983	28.974	.038	.078	.094	100	83	100
5	28.763	28.724	28.735	28.744	.118	.142	.078	100	58	100
6	28.917	29.052	29.225	29.065	.044	.079	.086	100	100	100
7	29.266	29.276	29.198	29.255	.042	.090	.030	100	100	69
9	29.128	28.993	28.829	28.987	.027	.103	.033	100	100	100
0	28.658	28.566	28.412	28.521	.052	.087	.094	100	84	100
0	28.415	28.531	28.629	28.528	.086	.098	.074	100	56	83
1	28.829	28.796	28.988	28.904	.066	.094	.108	100	78	100
3	29.083	29.051	29.801	29.111	.064	.117	.103	100	76	100
6	29.238	29.308	29.222	29.272	.103	.143	.123	100	79	100
5	28.895	28.530	28.340	28.588	.118	.117	.129	100	76	100
0	28.477	28.556	28.690	28.574	.129	.129	.101	100	88	86
5	28.791	28.882	28.943	28.938	.070	.084	.113	82	71	100
6	28.993	29.486	29.014	29.165	.055	.042	.048	100	59	100
8	29.103	29.143	29.216	29.154	.038	.090	.038	100	80	100
2	29.274	29.206	29.053	29.184	.023	.086	.082	100	100	100
4	28.906	28.407	28.560	28.624	.103	.108	.289	160	82	100
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	28.857	.077	.105	.092	92	83	86
.....					.091			87		



# OF FEBRUARY, 1867.

Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	12	28.752	28.831	28.805	28.800	.167	.129	.108	100	61	100
2	17	28.556	28.334	28.177	28.355	.108	.129	.153	100	88	100
3	8	28.280	28.362	28.491	28.377	.117	.155	.129	87	79	100
4	14	28.561	28.461	28.459	28.493	.087	.155	.147	84	79	100
5	13	28.639	28.843	28.896	28.792	.141	.143	.118	100	79	100
6	14	28.922	29.127	29.065	29.071	.106	.129	.108	86	61	100
7	20	29.104	29.116	28.989	29.066	.117	.139	.203	87	87	91
8	19	28.916	28.830	28.851	28.699	.168	.148	.183	89	86	80
9	-7	28.713	28.703	28.878	28.698	.117	.060	.057	87	71	100
10	-8	29.199	29.405	29.491	29.365	.040	.090	.082	100	100	100
11	8	29.350	29.259	29.176	29.261	.071	.090	.238	100	88	100
12	32	29.218	29.194	29.116	29.176	.136	.208	.209	62	91	75
13	30	28.961	28.747	28.941	28.883	.244	.300	.254	91	100	92
14	18	29.118	29.184	29.227	29.176	.183	.150	.125	90	80	100
15	19	29.119	29.106	28.842	29.048	.129	.162	.163	100	89	89
16	23	28.621	28.587	28.706	28.638	.183	.168	.212	90	89	100
17	21	28.986	29.033	29.005	29.006	.160	.108	.153	100	37	100
18	25	28.821	28.723	28.930	28.824	.108	.135	.190	45	93	90
19	18	29.032	28.990	28.869	28.963	.167	.148	.135	100	89	100
20	19	28.797	28.820	28.923	28.850	.141	.099	.148	100	88	89
21	20	28.761	28.768	29.029	28.819	.100	.113	.117	74	80	87
22	18	29.097	29.146	28.963	29.070	.117	.088	.117	87	49	87
23	22	28.626	28.415	28.865	28.468	.148	.142	.191	89	51	90
24	6	28.724	28.958	29.015	28.895	.147	.162	.075	103	89	100
25	8	29.015	29.000	29.008	29.007	.118	.181	.153	100	109	100
26	11	29.101	29.280	29.204	29.188	.082	.278	.167	100	109	109
27	14	29.314	29.392	29.137	29.281	.098	.143	.216	100	43	91
28	23	28.997	28.939	28.961	28.969	.225	.202	.183	91	62	90
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean	15°.7	.....	.....	.....	28.904	.123	.163	.161	90	72	95
						.152			85		



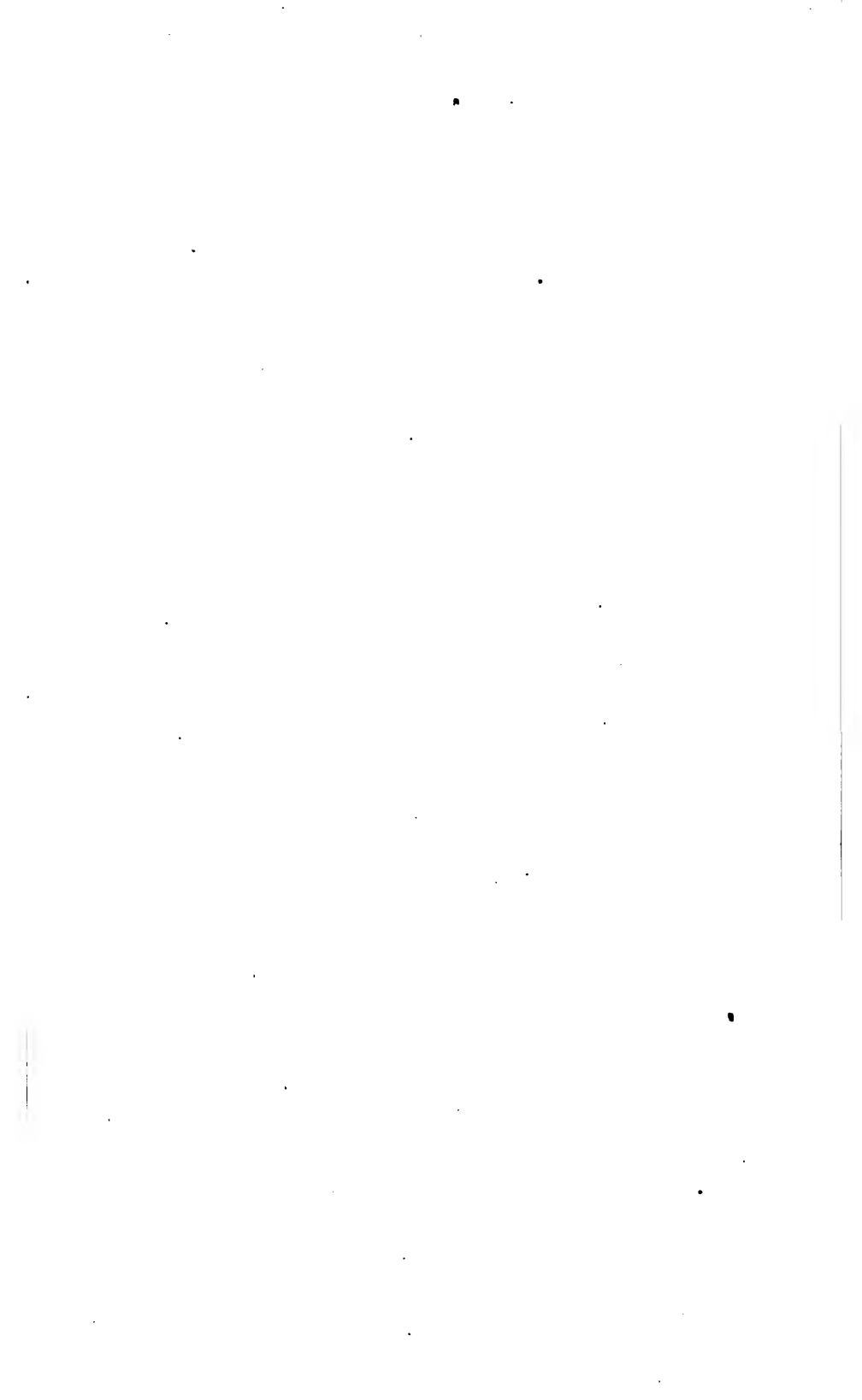


# H OF MARCH, 1867.

Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	21	28.687	28.480	28.368	28.401	.225	.809	.262	91	86	84
2	9	28.542	28.544	28.800	28.628	.141	.181	.188	100	100	100
3	9	28.901	28.789	28.699	28.780	.090	.118	.108	100	100	100
4	7	28.732	28.891	28.953	28.850	.078	.167	.123	100	100	100
5	18	29.125	29.204	29.289	29.206	.068	.174	.118	100	100	100
6	13	29.805	29.124	29.046	29.157	.060	.167	.167	100	100	100
7	16	29.900	29.042	29.187	29.043	.123	.123	.163	87	84	100
8	23	29.267	29.248	29.211	29.237	.135	.181	.167	100	88	100
9	24	29.167	29.044	29.016	29.072	.147	.130	.170	100	45	80
10	27	28.708	28.443	28.621	28.590	.208	.298	.216	91	92	91
11	17	28.968	28.620	28.982	28.990	.181	.155	.142	100	88	88
12	13	28.866	28.858	28.905	28.873	.100	.168	.142	79	89	88
13	1	28.861	28.886	29.004	28.953	.153	.098	.080	100	100	100
14	0	29.101	29.208	29.284	29.181	.048	.108	.068	100	100	100
15	6	29.213	29.240	28.692	29.148	.080	.147	.113	100	100	100
16	17	29.071	29.056	28.864	29.002	.108	.167	.129	100	100	100
17	6	28.677	28.808	29.016	28.833	.118	.103	.068	100	100	100
18	2	28.962	29.005	29.277	29.081	.071	.168	.090	100	89	100
19	16	29.019	29.117	29.143	29.093	.118	.155	.178	100	79	81
20	22	29.208	29.146	28.820	29.091	.141	.155	.168	100	88	89
21	18	28.943	28.863	29.030	28.961	.162	.191	.168	89	90	89
22	29	28.902	29.981	28.992	28.958	.181	.190	.191	100	74	90
23	30	29.050	29.050	28.903	29.000	.133	.196	.186	90	68	81
24	19	29.926	28.661	29.282	29.036	.188	.196	.183	90	82	90
25	18	29.174	29.196	28.778	29.049	.111	.155	.135	86	79	100
26	18	29.213	28.986	28.847	29.017	.141	.163	.129	100	100	100
27	11	28.723	28.742	28.950	28.805	.123	.174	.185	100	100	100
28	16	28.929	28.947	28.910	28.928	.118	.097	.155	100	39	88
29	24	28.982	28.918	28.813	28.904	.153	.095	.125	100	32	69
30	25	28.114	28.921	28.559	28.493	.150	.166	.142	80	49	70
31	29	28.789	28.655	28.561	28.668	.116	.165	.204	58	84	100
Sum		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean		.....	.....	.....	28.930	.129	.155	.113	94	79	92
		.....	.....	.....	.....	.134	.....	.....	88	.....	.....







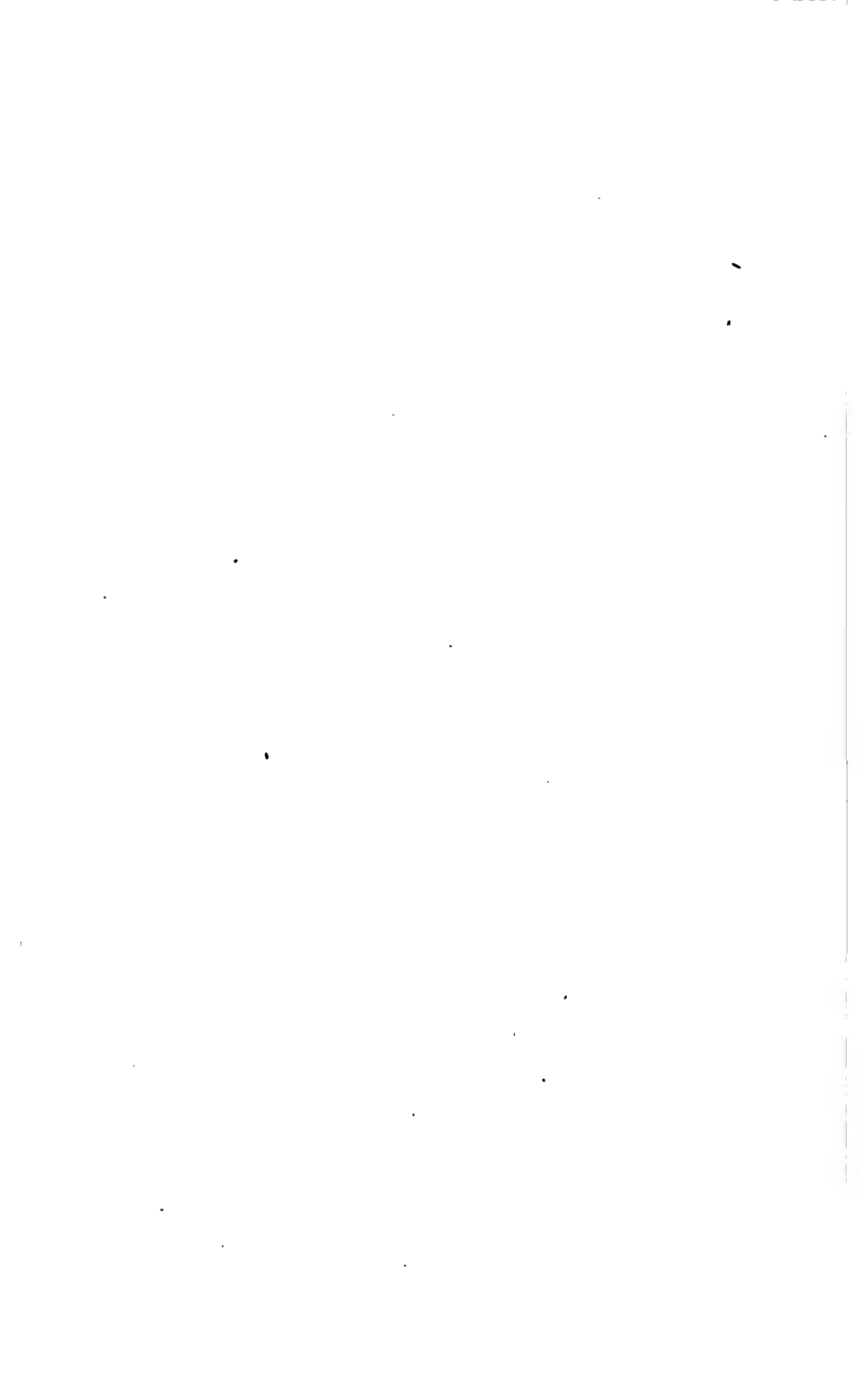




# H OF JUNE, 1867.

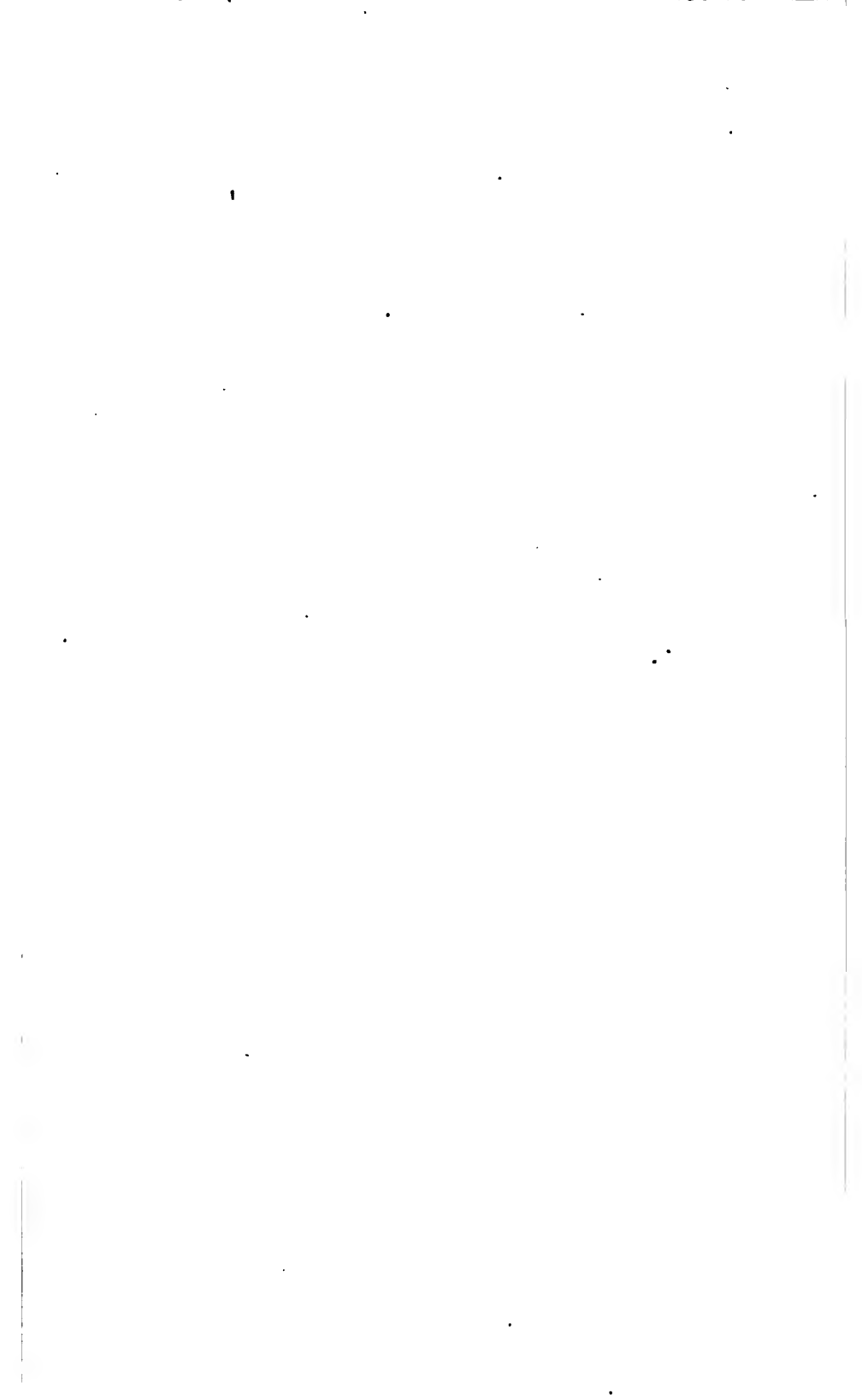
Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	55	28.970	28.874	28.591	28.790	.823	.878	.478	65	59	83
2	52	28.492	28.409	28.404	28.435	.612	.483	.426	90	78	78
3	46	28.506	28.591	28.690	28.596	.363	.420	.405	81	68	94
4	47	28.747	28.796	28.856	28.800	.438	.382	.469	68	44	94
5	61	28.899	28.888	28.888	28.890	.489	.545	.411	75	47	80
6	57	28.730	28.748	28.764	28.767	.564	.805	.577	61	65	85
7	58	28.888	28.851	28.844	28.844	.621	.708	.631	85	55	81
8	52	28.946	28.937	28.986	28.956	.529	.624	.509	89	59	75
9	50	29.016	29.007	28.983	29.002	.411	.438	.464	30	41	74
10	55	29.006	28.983	28.941	28.976	.469	.335	.502	62	32	78
11	50	28.938	28.910	28.886	28.911	.595	.677	.639	78	66	100
12	53	28.921	28.915	28.937	28.924	.612	.610	.556	90	50	84
13	58	28.981	28.956	28.950	28.962	.641	.762	.664	77	62	94
14	50	28.953	28.880	28.847	28.878	.689	.614	.659	69	68	100
15	55	28.800	28.782	28.772	28.784	.731	.904	.599	81	83	85
16	60	28.908	28.902	28.912	28.906	.531	.608	.570	72	80	89
17	54	28.903	28.817	28.938	28.886	.731	.733	.523	81	100	94
18	44	28.961	29.013	29.066	29.013	.356	.346	.457	62	45	69
19	55	29.185	29.094	29.062	29.113	.464	.452	.456	77	44	88
20	52	29.071	29.054	29.041	29.055	.464	.514	.464	77	54	77
21	56	29.077	29.043	29.016	29.045	.543	.558	.502	79	50	78
22	65	29.011	28.979	28.907	28.963	.628	.599	.785	73	59	100
23	58	28.978	28.849	28.839	28.857	.746	1.325	.576	64	88	109
24	61	28.819	28.719	28.671	28.736	.785	.823	.644	82	62	86
25	50	28.729	28.746	28.759	28.744	.787	.624	.891	74	59	87
26	60	28.812	28.831	28.869	28.817	.564	.691	.612	79	57	90
27	48	28.779	28.787	28.837	28.829	.591	.523	.487	68	51	94
28	43	29.063	29.067	29.041	29.060	.354	.356	.361	66	38	93
29	54	29.054	28.947	28.847	28.962	.451	.460	.529	78	42	75
30	54	28.719	28.716	28.761	28.732	.626	.721	.612	65	53	90
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sum.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means	52°.06	.....	.....	.....	28.872	.557	.596	.518	74	59	86
Av	.....	.....	.....	.....	.....	.....	.556	.....	.....	73	.....





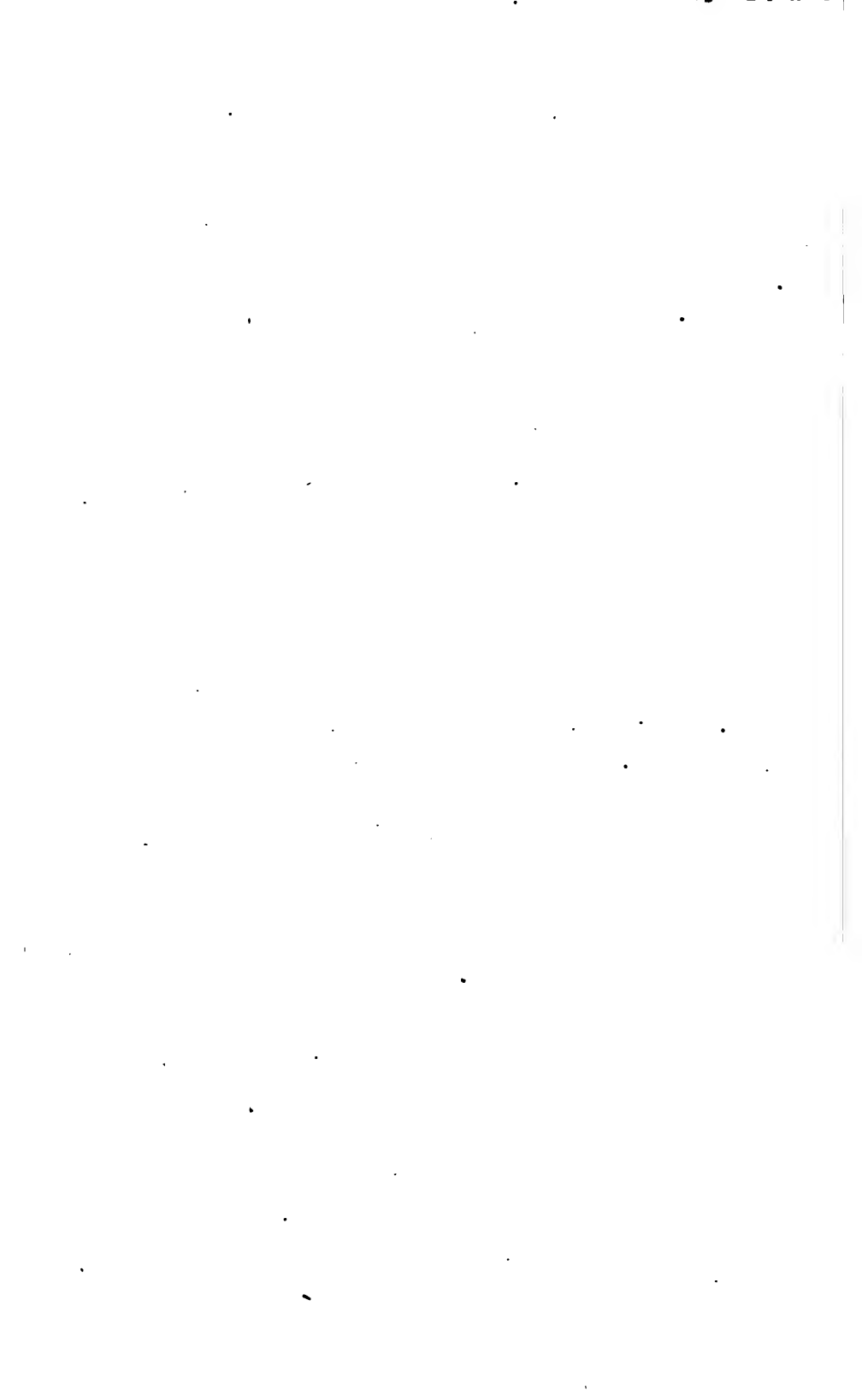
# H OF JULY, 1867.

Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
66		28.906	28.892	28.900	28.899	.435	.624	.668	64	59	86
62		28.900	28.874	28.849	28.874	.695	.755	.759	76	48	100
75		28.865	28.858	28.796	28.849	.581	.596	.718	72	43	86
74		28.752	28.683	29.629	29.661	.705	.719	.706	81	58	90
58		28.634	28.643	28.611	28.629	.782	.829	.785	90	79	100
61		28.602	28.609	28.697	28.696	.549	.650	.591	89	59	89
45		28.867	28.912	28.980	28.900	.457	.436	.429	66	49	77
54		29.033	29.000	28.998	29.004	.502	.465	.483	78	47	100
55		29.101	29.093	29.027	29.073	.426	.296	.406	82	36	94
59		29.005	28.816	28.792	28.871	.396	.609	.438	76	46	37
55		28.819	28.801	28.847	28.823	.617	.623	.586	77	53	84
36		29.078	29.038	29.016	29.044	.396	.893	.361	76	59	93
53		29.125	29.103	29.096	29.103	.340	.457	.464	61	49	77
69		29.102	29.043	28.991	29.045	.516	.492	.476	70	53	69
44		28.919	28.923	28.976	28.939	.608	.589	.316	80	72	49
44		29.076	29.076	29.076	29.076	.399	.306	.366	72	34	76
50		29.112	29.101	29.081	29.093	.429	.487	.442	77	43	83
56		29.039	29.066	29.033	29.063	.346	.438	.482	54	41	66
50		29.044	29.021	29.021	29.023	.438	.595	.536	68	76	92
50		29.084	29.068	29.026	29.059	.491	.815	.523	88	31	94
60		29.012	28.946	28.900	28.952	.496	.507	.781	70	43	81
60		28.888	28.847	28.845	28.869	.503	.582	.678	66	41	73
64		28.867	82.867	28.878	28.867	.678	.741	.691	73	46	69
69		28.915	28.913	28.864	28.898	.704	.796	.812	73	56	91
65		28.804	28.719	28.722	28.743	.663	.717	.733	85	77	100
57		28.789	28.799	28.937	28.796	.599	.572	.626	85	52	95
55		28.815	28.764	28.789	28.772	.612	.796	.812	90	56	91
53		28.712	28.712	28.772	28.732	.870	.447	.623	91	40	73
45		28.991	29.061	29.066	29.033	.383	.266	.413	71	34	77
56		29.132	29.068	29.043	29.039	.429	.409	.376	77	43	59
60		28.907	28.858	28.792	28.852	.464	.537	.543	77	71	94
56°.5					28.915	.531	.549	.561	76	53	81
						.547			70		



# OF AUGUST, 1867.

Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	60	28.758	28.725	28.710	28.731	.536	.612	.543	84	82	94
2	53	28.791	28.865	28.870	28.842	.460	.463	.473	83	56	88
3	50	28.963	28.884	28.907	28.948	.487	.497	.623	94	45	94
4	57	29.074	29.051	29.051	29.058	.449	.584	.626	61	50	66
5	64	29.094	29.073	29.066	29.077	.595	.665	.705	76	47	81
6	60	29.061	29.026	29.042	29.043	.644	.623	.671	86	48	96
7	60	29.044	29.044	29.004	29.030	.633	.746	.720	90	64	96
8	60	28.936	28.944	28.907	28.945	.630	.677	.626	81	54	93
9	60	28.933	28.901	28.909	28.913	.680	.735	.718	81	56	86
10	42	29.069	29.100	29.099	29.089	.370	.561	.423	66	55	88
11	53	29.134	29.101	29.101	29.112	.439	.425	.476	89	69	69
12	60	28.879	28.761	28.669	28.769	.509	.630	.717	75	46	77
13	55	28.719	28.722	28.643	28.694	.626	.591	.489	95	68	76
14	58	28.909	28.920	28.956	28.923	.565	.487	.556	94	48	100
15	52	29.042	29.005	29.016	29.021	.577	.483	.626	85	48	95
16	57	29.002	28.940	28.850	28.937	.536	.452	.563	84	44	94
17	65	28.783	28.729	28.660	28.727	.516	.704	.626	70	66	65
18	52	28.729	28.757	28.811	28.763	.706	.483	.516	90	43	70
19	53	28.936	28.941	28.941	28.939	.413	.476	.436	77	59	94
20	45	28.995	28.991	28.977	28.988	.361	.492	.487	87	53	94
21	53	28.968	28.886	28.891	28.915	.426	.417	.505	82	41	94
22	60	28.872	28.821	28.785	28.826	.478	.650	.599	33	54	85
23	54	28.768	28.762	28.755	28.758	.608	.542	.693	80	33	86
24	36	28.866	28.899	28.988	28.917	.473	.415	.407	88	48	87
25	42	29.065	29.014	29.028	29.035	.463	.396	.407	67	40	87
26	50	29.019	28.966	28.966	28.957	.376	.433	.456	87	37	88
27	56	28.905	28.785	28.722	28.804	.439	.771	.708	88	95	100
28	40	28.660	28.787	28.797	28.732	.658	.772	.491	90	86	88
29	30	28.851	28.856	28.977	28.896	.334	.635	.361	86	90	93
30	36	29.064	29.097	29.035	29.078	.206	.274	.206	91	41	92
31	50	28.895	28.780	28.712	28.795	.336	.439	.487	75	88	94
Sums											
Means		51°.7			28.911	.499	.559	.508	82	54	88
A						.522			74		



OF SEPTEMBER, 1867.

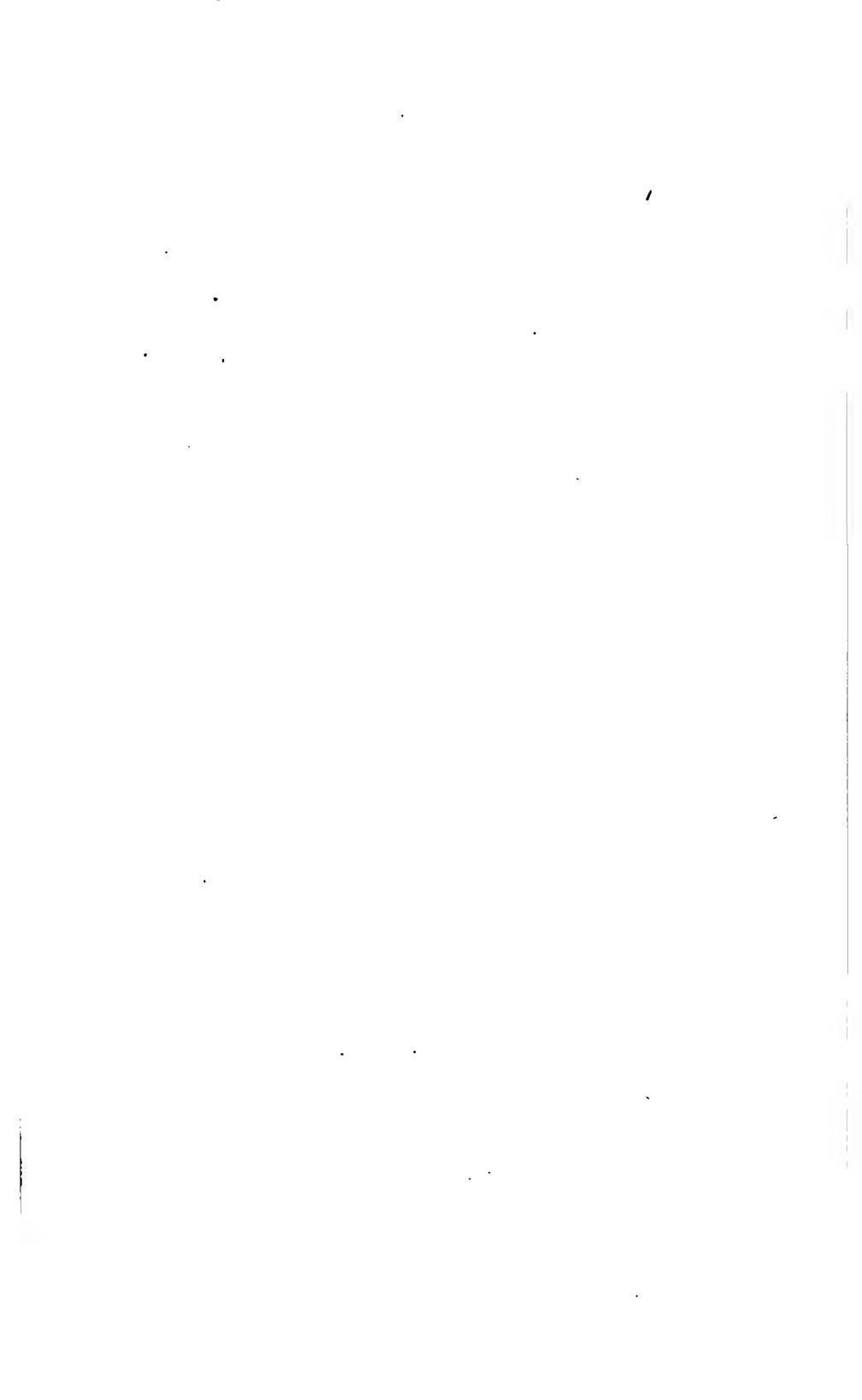
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# OF DECEMBER, 1867.

Day of Month.	Min. Thermometer.	BAROMETER HEIGHT REDUC'D TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.		
		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	7	28.900	28.898	28.897	28.927	.067	.084	.086	79	71	72
2	16	28.975	28.186	28.977	28.912	.129	.103	.123	88	48	87
3	2	28.997	28.839	28.828	28.885	.129	.149	.139	88	71	78
4	8	28.848	28.727	28.778	28.788	.068	.105	.106	100	75	86
5	19	28.652	28.721	28.677	28.684	.106	.148	.148	86	89	89
6	18	28.817	28.168	28.615	28.832	.165	.249	.165	79	77	89
7	1	28.819	28.908	29.087	28.921	.091	.077	.081	85	68	77
8	1	29.098	29.073	29.128	29.099	.063	.049	.067	81	38	68
9	9	29.121	29.012	28.974	29.026	.078	.063	.070	83	42	39
10	20	28.769	28.838	28.834	28.810	.087	.118	.129	54	68	83
11	8	28.824	28.811	28.815	28.817	.105	.111	.104	75	86	86
12	-3	28.814	28.858	28.994	28.855	.061	.047	.060	63	50	86
13	-10	29.034	29.074	29.122	29.043	.017	.087	.063	39	45	81
14	-9	28.931	28.856	28.835	28.894	.067	.068	.059	81	59	65
15	-5	28.902	28.861	28.831	28.865	.036	.068	.080	72	58	71
16	15	28.821	28.715	28.685	28.740	.096	.111	.106	85	75	88
17	18	28.625	28.694	28.769	28.696	.106	.143	.165	86	79	89
18	-12	28.957	29.119	29.225	29.100	.117	.111	.098	87	75	100
19	2	29.297	29.237	29.044	29.193	.082	.088	.096	70	62	85
20	0	28.837	28.961	29.117	28.972	.117	.149	.165	76	71	89
21	13	29.184	28.925	28.732	28.947	.098	.130	.162	100	78	89
22	3	28.788	28.547	28.418	28.584	.191	.155	.174	90	79	100
23	14	29.031	29.169	29.125	29.108	.117	.155	.117	89	89	87
24	22	28.864	28.770	28.849	28.828	.142	.121	.155	88	48	89
25	28	28.705	28.893	28.890	28.896	.238	.297	.322	100	85	92
26	24	28.846	29.006	28.760	28.887	.181	.212	.294	100	82	100
27	24	28.429	28.437	28.826	28.564	.809	.322	.298	85	92	91
28	12	28.940	28.935	29.011	28.962	.148	.162	.111	89	89	86
29	2	29.164	29.256	29.350	29.257	.087	.108	.070	84	86	82
30	-6	29.388	29.436	29.424	29.082	.082	.087	.054	100	84	78
31	-1	29.280	29.000	28.754	29.025	.062	.148	.123	100	79	87
Sum.		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means		6°.08	.....	.....	28.668	.138	.123	.118	77	70	81
Av.		.....	.....	.....	.....	.118	.....	.....	76	.....	.....





## WINDS.

---

This is for the record of the direction from which the wind is blowing as indicated by the vane, and its force by estimation. The direction is entered in eight points of the compass: N., N. E., E., S. E., S., S. W., W., N. W. The force is to be estimated and registered by the following table, in figures from 1 to 10:

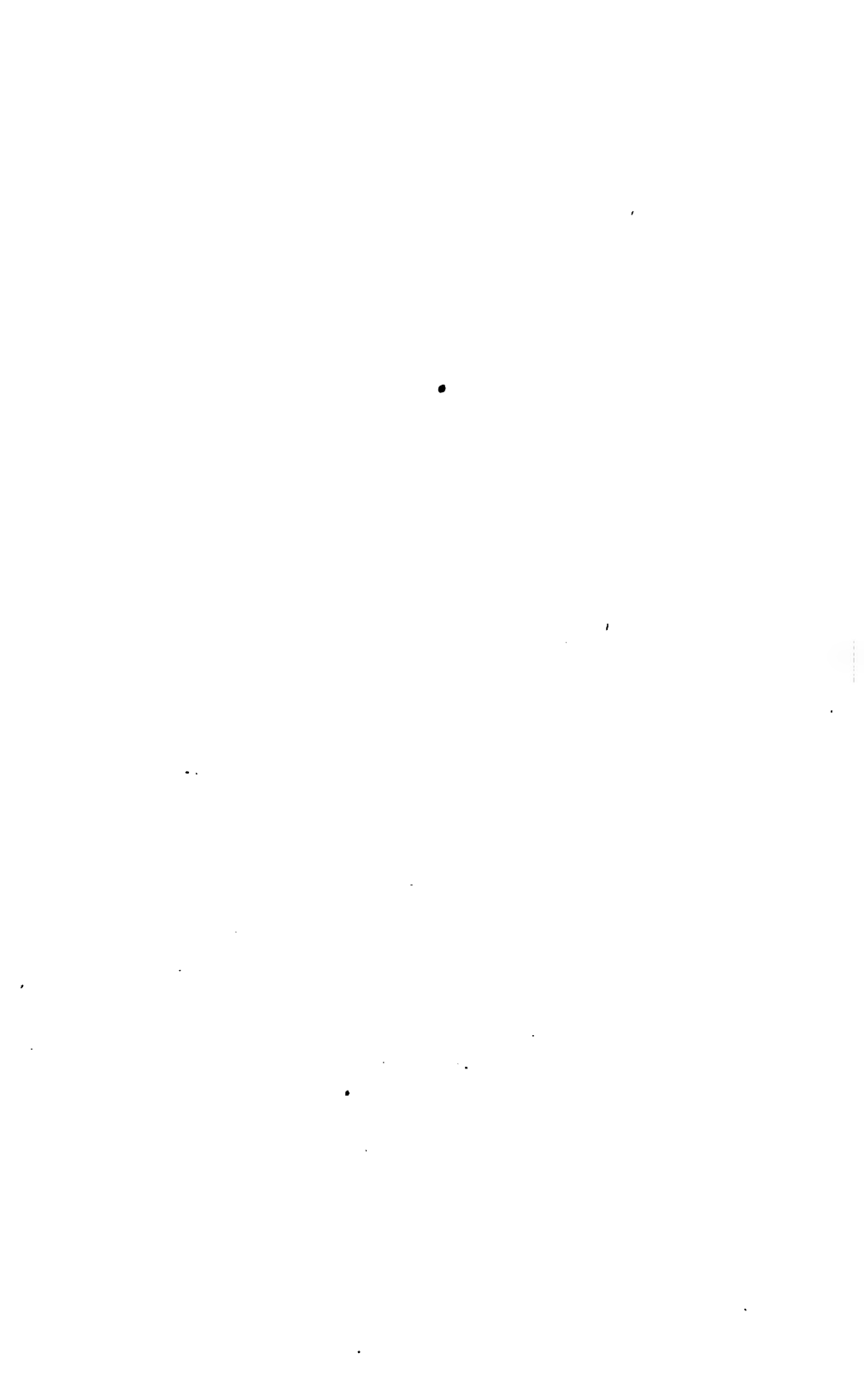
1. Very light breeze,.....	2 miles per hour.
2. Gentle breeze, .....	4    "    "
3. Fresh breeze, .....	12    "    "
4. Strong wind,.....	25    "    "
5. High wind, .....	35    "    "
6. Gale, .....	45    "    "
7. Strong gale,.....	60    "    "
8. Violent gale, .....	75    "    "
9. Hurricane,.....	90    "    "
10. Most violent hurricane, .....	100    "    "

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## ABSTRACT OF METEOROLOGICAL OBSERVATIONS FOR 1867.

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	AVERAGE FOR 1867.	AVERAGE FOR FOUR YEARS.
Thermometer in open air,.....	46°.95	47°.31
Mean of Max. Register Thermometer,.....	56°.03	54°.29
Mean of Min. Register Thermometer,.....	31°.07	32°.72
Rain-fall, .....	24.576	30.569
Percentage of Cloudiness,.....	54.7	63.07
Barometer at 32° temperature, .....	29.882	29.878



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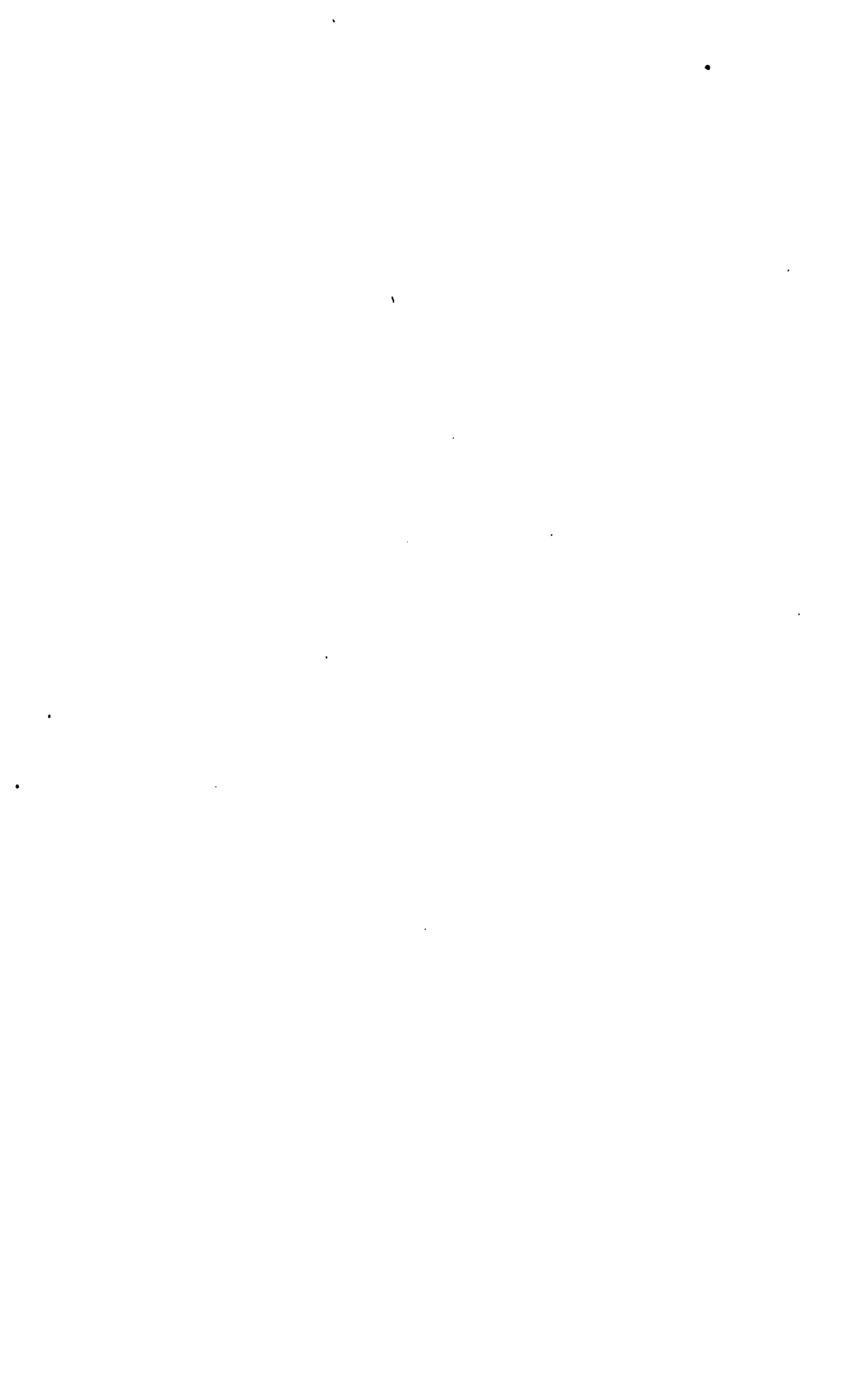
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